FINDING OF NO SIGNIFICANT IMPACT

This Environmental Assessment (EA) evaluates the probable environmental impacts of the Proposed Action and alternatives on local and regional resources as a result of military family housing privatization at Vandenberg Air Force Base (AFB). The EA was prepared pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended, 42 United States Code 4321, *et seq.*; the Council on Environmental Quality regulations implementing NEPA, 40 Code of Federal Regulations (CFR) 1500–1508; and 32 CFR 989 as referenced in Air Force Instruction 32-7061, *Environmental Impact Analysis Process*. The responsible agency is the United States Air Force, Vandenberg AFB.

DESCRIPTION OF THE PROPOSED ACTION

The proposed action is for Vandenberg AFB to lease 458 acres of land to the Project Owner (PO) and to transfer ownership of the residences and infrastructure on the property to the PO. Of the 1,336 homes to be transferred, 501 are Capehart units and 835 are military construction (MILCON) replacement units. The results of the Housing Requirements and Market Analysis conducted in 2006 indicated a military family housing requirement for Vandenberg AFB of 867 units.

During the 6-year Initial Development Period, the PO would demolish all 501 Capehart units, renovate 703 of the MILCON units, and construct 164 new units to achieve an end state of 867 residences that would meet the projected demographic needs of Vandenberg AFB. The remaining 132 MILCON units that would not be renovated would be considered excess to the needs of Vandenberg AFB. The PO would have the option of either demolishing these 132 excess MILCON units or retaining them as additional housing; for purposes of analysis in this EA, we assume the PO would retain these units. At the end of the Initial Development Period, the lease on 4 acres of land comprising a cultural resources site would be terminated and the property would remain in an undeveloped state. The lease on the remaining 454 acres would be continued for an additional 44 years, for a total of 50 years. The PO would obtain necessary financing; plan, design, and develop the housing area and infrastructure; and maintain and manage the housing area as a rental housing development.

ALTERNATIVE 1

Under Alternative 1, the property leasing and transfer arrangements would be as described for the Proposed Action. During the Initial Development Period, the PO would demolish the 501 Capehart units as well as 752 of the MILCON units; the remaining 83 MILCON units would be renovated. The PO would construct 784 new housing units to achieve an end state of 867 residences.

NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the Air Force would not implement the privatization program at Vandenberg AFB, and the residences in West Housing would remain under Air Force ownership. Vandenberg AFB would continue to manage and maintain the existing housing.

SUMMARY OF THE ANTICIPATED ENVIRONMENTAL IMPACTS

In describing potential impacts, the wording "short-term" is used to refer to the 6-year Initial Development Period, during which construction, renovation, and demolition activities would occur under

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
AUG 2007		**00-00-2007 to 00-00-2007**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Finding of No Significant Impact: Environmental Assessment for Military Family Housing Privatization Initiative, Vandenberg Air Force Base, California	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Tetra Tech Inc,3201 Airpark Drive,Santa Maria,CA,93455**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**209**	

both the Proposed Action and Alternative 1. The wording "long-term" refers to the remaining term of the property lease.

Air Quality. Under the Proposed Action and Alternative 1, there would be short-term fugitive dust emissions, engine emissions from construction and demolition equipment and worker vehicles, and emissions from architectural coatings. Emissions related to construction, demolition, and renovation would be below *de minimis* levels and would be managed by implementing measures to control dust and to reduce the vehicle emissions. There would be no long-term air quality impacts. Under the No-Action Alternative, there would be no air quality impacts.

Cultural Resources. Under all alternatives, there would be no impacts to cultural resources with archaeologists monitoring ground-disturbing activities at all known cultural resources sites and Native American monitoring at all cultural resources sites except CA-SBA-3559H. Under the Proposed Action and Alternative 1, the Capehart units on Parcel B would be demolished and the area would be left as undeveloped land. The PO would be provided with a copy of the most current signed version of the base's Integrated Cultural Resources Management Plan as well as any drafts of revisions.

Geology and Soils. Under the Proposed Action and Alternative 1, there would be potential short-term impacts resulting from soil disturbance. There would be no long-term impacts. There would be no impacts under the No-Action Alternative.

Hazardous Materials and Hazardous Waste. Any hazardous materials used by the PO under either the Proposed Action or Alternative 1 would be stored and managed according to applicable federal, state, and local regulatory requirements. Any hazardous waste generated during construction, demolition, and renovation activities would also be appropriately managed. There would be no long-term hazardous materials or hazardous waste impacts. Under the No-Action Alternative, there would be no hazardous materials or hazardous waste impacts.

Land Use. Under all of the alternatives, there would be no land use impacts because there would be no change in land use.

Natural Resources. Under the Proposed Action and Alternative 1, pre-construction surveys for the presence of special-status species, nesting birds, or use of trees by monarch butterflies would be required. Removal of mature trees would be kept to a minimum. There would be no disturbance of potential wetland areas near West Housing. There would likely be localized, short-term impacts to wildlife from noise and disturbance associated with construction and demolition activities; these impacts would be temporary. No long-term impacts would be anticipated; housing residents would be provided with information on types of native plants that can be used for landscaping to avoid the introduction or spread of invasive species. There would be no impacts to natural resources under the No-Action Alternative. The PO would be provided with a copy of the most current signed version of the base's Integrated Natural Resources Management Plan as well as any drafts of revisions.

Noise. Under both the Proposed Action and Alternative 1, there would be short-term noise impacts from heavy equipment use. There would be no long-term impacts. Under the No-Action Alternative, there would be no noise impacts.

Police, Fire, and Emergency Services. Under all the alternatives, there would be no impacts to police, fire, and emergency services. These services would continue to be provided by Vandenberg AFB.

Safety and Occupational Health. Under the Proposed Action and Alternative 1, there would potentially be short-term exposure of workers to lead-based paint, asbestos, fluorescent light ballasts containing polychlorinated biphenyls, chlordane in soils, and hazardous substances released from inactive underground storage tanks. There would also be potential safety hazards involving heavy equipment and added vehicular traffic. There would be no long-term impacts. Under the No-Action Alternative, there would continue to be potential health impacts from residents' exposure to lead-based paint and asbestos in the Capehart housing units. There would also be potential safety issues from deteriorated plumbing and wiring systems in these units.

Socioeconomic Factors. Under all the alternatives, there would be no socioeconomic impacts.

Solid Waste. Construction and demolition debris would be generated under both the Proposed Action and Alternative 1. For discussion purposes in this EA, we assume the PO would choose to dispose of solid waste from construction, demolition, and renovation activities at the Vandenberg AFB landfill; however, the PO does have the option of disposing of solid waste at an off-base location. The amount of debris generated would be within the permitted limit of what the landfill can accept on a daily basis. Municipal solid waste and recyclables would continue to be collected from residents within the West Housing area by a contractor; the solid waste would be taken to the base landfill for disposal, and the recyclables would be taken off-base for processing. No impacts to solid waste management would be expected from any of the alternatives.

Traffic and Transportation. Under the Proposed Action and Alternative 1, there would be potential short-term impacts from additional traffic related to construction, demolition, and renovation activities. There would be no long-term impacts. There would be no traffic or transportation impacts under the No-Action Alternative.

Utilities. Under the Proposed Action and Alternative 1, there could be minor, short-term impacts to housing residents from brief service interruptions during construction and demolition. There would be no long-term impacts. There would be no utility impacts under the No-Action Alternative.

Water Resources. Under both the Proposed Action and Alternative 1, there would be potential short-term impacts to water resources from storm water runoff. These potential impacts would be mitigated through the use of appropriate storm water control techniques. There would be no long-term impacts. Under the No-Action Alternative, there would be no impacts to water resources.

FINDINGS AND CONCLUSION

Following a review of the EA, we find that the proposed Military Family Housing Privatization Program at Vandenberg AFB would not result in significant environmental impacts. Based upon the information contained within this assessment, a Finding of No Significant Impact is made. The preparation of an Environmental Impact Statement is not required for this action. An EA of the Proposed Action is on file at:

Environmental Flight
30 CES/CEV
1028 Iceland Avenue
Vandenberg AFB, California 93437-6010
ATTN: Environmental Coordinator

FINDING OF NO SIGNIFICANT IMPACT
CONCURRENCE PAGE

Environmental Assessment for Military Family Housing Privatization Initiative, Vandenberg AFB, California

Environmental, Safety, and Occupational Health Council Approval:

22 OCT 07

MICHAEL E. FORTNEY, Colonel, USAF
Vice Commander, 30th Space Wing
Chairman, Environmental, Safety, and Occupational Health Council
Vandenberg AFB, CA

Judge Advocate Approval

22 OCT 07

VINCENT M. BUQUICCHIO, Lt Col, USAF
Staff Judge Advocate
Vandenberg AFB, CA

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Deputy Staff Judge Advocate, ACTING

Squadron Approval:

22 Oct 2007

DAVID C. PIECH, Lt Col, USAF
Commander, 30th Civil Engineer Squadron
Vandenberg AFB, CA

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TETRA TECH

C155-3473
Task 0091

23 October 2007

Mr. Jesse Barrera
Contracting Officer's Representative
HQ AFCEE/HDP
2735 Louis Bauer Drive
Brooks City-Base, Texas 78235-5113

Mr. Rick Herman
On-site Coordinator
30 CES/CECE (BAH) 5 CES/CEV
1172 Iceland Avenue, Building 11433
Vandenberg AFB CA 93437-6011

Subject: Environmental Assessment and Finding of No Significant Impact for Privatization of Military Family Housing at Vandenberg AFB, California (CDRL A001D).

Reference: Contract No. F41624-03-D-8617-0091

Dear Mr. Barrera and Mr. Herman:

Tetra Tech respectfully submits the Environmental Assessment and associated Finding of No Significant Impact for the Privatization of Military Family Housing Initiative at Vandenberg AFB, California. One hard copy and two electronic copies on compact disc are being provided. Five hard copies and two electronic copies are also being provided to Ms. Dina Ryan, Environmental Flight (30 CES/CEV).

If you have any questions or require any additional information, please contact me at (805) 739-2600 ext. 241, or by email at alex.abela@tetratech.com.

Respectfully,

TETRA TECH, INC.

Alex Abela
Project Manager

Attachment: as stated

cc: AF Matériel Command (HSW/PKV-C) (ltr)
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Data Librarian (AFCEE/MSCD) (ltr)
Defense Contract Management Command Van Nuys-South) (DCMC) (ltr)
Eldridge, J. (Tt-SMX)
Fitch, N. (Tt-SMX)
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Petersen, B. (Tt-TTC) (ltr)

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TETRA TECH

C155-3334
Task 0091

28 August 2007

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Mr. Rick Herman
On-site Coordinator
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1172 Iceland Avenue, Building 11433
Vandenberg AFB CA 93437-6011

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Environmental Impact Analysis Process

Environmental Assessment for Military Family Housing Privatization Initiative, Vandenberg Air Force Base, California

August 2007

United States Air Force

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1028 Iceland Avenue
Vandenberg AFB, California 93437-6010

HQ AFCEE/ICS
3300 Sidney Brooks Road
Brooks City-Base, Texas 78235-5112

DRAFT
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FINDINGS AND CONCLUSION

Following a review of the EA, we find that the proposed Military Family Housing Privatization Program at Vandenberg AFB would not result in significant environmental impacts. Based upon the information contained within this assessment, a Finding of No Significant Impact is made. The preparation of an Environmental Impact Statement is not required for this action. An EA of the Proposed Action is on file at:

Environmental Flight
30 CES/CEV
1028 Iceland Avenue
Vandenberg AFB, California 93437-6010
ATTN: Environmental Coordinator

FINDING OF NO SIGNIFICANT IMPACT
CONCURRENCE PAGE

Environmental Assessment for Military Family Housing Privatization Initiative, Vandenberg AFB, California

Environmental, Safety, and Occupational Health Council Approval:

_____ _____

MICHAEL E. FORTNEY, Colonel, USAF
Vice Commander, 30th Space Wing
Chairman, Environmental, Safety, and Occupational Health Council
Vandenberg AFB, CA

Judge Advocate Approval

_____ _____

VINCENT M. BUQUICCHIO, Lt Col, USAF
Staff Judge Advocate
Vandenberg AFB, CA

Squadron Approval:

_____ _____

DAVID C. PIECH, Lt Col, USAF
Commander, 30th Civil Engineer Squadron
Vandenberg AFB, CA

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1.0 PURPOSE AND NEED

***Preparer's Note**: Because this Draft Environmental Assessment is being written prior to receipt of the Project Owner's conceptual plan, the analysis of the Proposed Action provided in chapter 4, Environmental Consequences, is based upon best available information of how such a plan would address the housing needs of Vandenberg Air Force Base as well as the goals of the Military Housing Privatization Initiative program. The analysis is representative of the analytical method to be used once the Project Owner's plan is developed. Should the Project Owner plan a project that will affect the environment in a way—or ways—not addressed in this Environmental Assessment, then preparation of a Supplemental Environmental Assessment will be required.*

1.1 INTRODUCTION

This Environmental Assessment (EA) evaluates the potential environmental impacts associated with the privatization of a portion of Military Family Housing (MFH) on Vandenberg Air Force Base (AFB). This MFH area is locally referred to as West Housing.

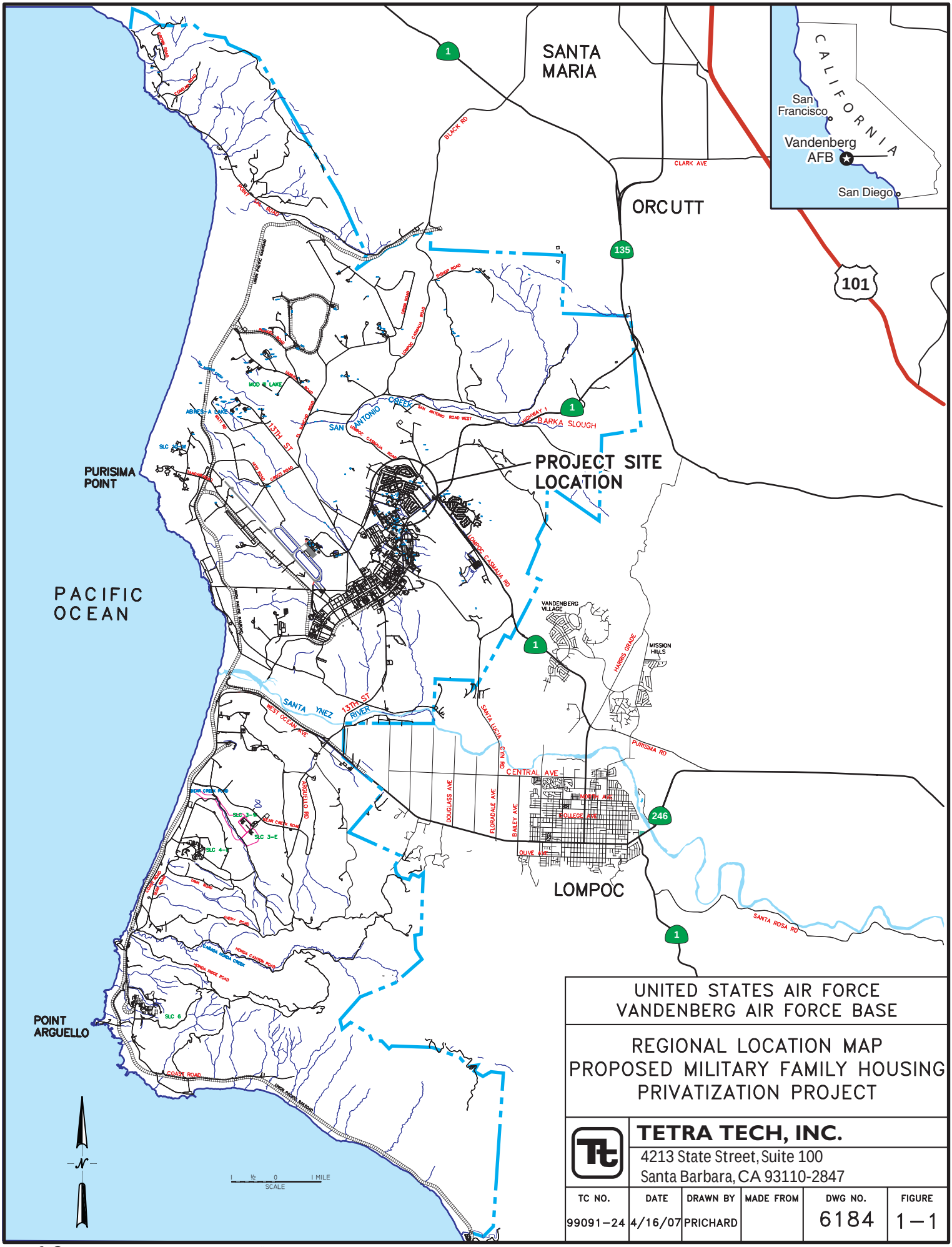
This EA was prepared in accordance with all applicable federal, state, and local laws and regulations including the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [U.S.C.] 4321, *et seq*.); the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] 1500–1508); U.S. Air Force Instruction (AFI) 32-7061, *The Environmental Impact Analysis Process (EIAP)*; and Title 32 CFR Part 989, which implements these regulations in the EIAP and other federal and local regulations. The 30th Space Wing is representing the Department of Defense (DOD) as the lead agency.

Privatization actions are categorized as federal actions that are subject to the requirements of NEPA and the Air Force EIAP. The site proposed for privatization is located entirely on Vandenberg AFB, meaning that the NEPA requirements, in this case, can be met as if the project were a normal military construction (MILCON) project. Had the proposed privatization site been located partly or entirely off-base, the information needed for the NEPA process would have been provided in the form of an Environmental Considerations Document, included as part of each offeror's proposal for privatization development (U.S. Air Force 1996).

1.2 LOCATION OF PROPOSED ACTION

The Proposed Action would occur within the MFH area on Vandenberg AFB referred to as West Housing. Vandenberg AFB is located on the Central Coast of California, approximately 150 miles northwest of Los Angeles and 275 miles south of San Francisco, and is entirely within the county of Santa Barbara (Figure 1-1). The cities of Lompoc and Santa Maria are located within 15 miles of the base, and the city of Santa Barbara is approximately 60 miles to the southeast. Vandenberg AFB occupies an area of 99,578 acres, or approximately 156 square miles. The total base population (including the 30th Space Wing and the Air National Guard) consists of approximately 4,000 military members, 1,500 government civil service employees, and 2,700 contractor and private business individuals, for a total of approximately 8,300 personnel. Including military family members, the base supports approximately 17,000 people.

There are two MFH areas on the base, locally referred to as East Housing and West Housing, which, at one time, had a combined total of 1,969 family housing units. There were 633 units comprising single-family dwellings, duplexes and townhouses on 220 acres in the East Housing area, which is on the east



UNITED STATES AIR FORCE
VANDENBERG AIR FORCE BASE

REGIONAL LOCATION MAP
PROPOSED MILITARY FAMILY HOUSING
PRIVATIZATION PROJECT

TETRA TECH, INC.
4213 State Street, Suite 100
Santa Barbara, CA 93110-2847

TC NO.	DATE	DRAWN BY	MADE FROM	DWG NO.	FIGURE
99091-24	4/16/07	PRICHARD		6184	1-1

1" =approx 15,000ft

side of State Highway 1, and 1,336 single-family dwellings on approximately 458 acres in the West Housing area, which is on the west side of State Highway 1. Units in the East Housing area are currently being demolished.

During previous concepts of the housing privatization project, both East Housing and West Housing were included in the project footprint, along with a 114-acre expansion area adjacent to the northwest portion of West Housing. Both the expansion area and East Housing were excluded from the project footprint for several reasons. First, the Housing Requirements and Market Analysis (HRMA) conducted in 2006 indicated a military family housing requirement for Vandenberg AFB of 867 units (Science Applications International Corporation [SAIC] 2006). The area encompassed by West Housing is large enough to accommodate all of these units. Second, the East Housing area is outside of the Vandenberg AFB main gate, and therefore is in a less secure area than West Housing. Third, portions of East Housing are within or adjacent to areas used in the past as small arms, mortar, and rocket ranges, and there is the potential for unexploded ordnance (UXO) to be present. A geophysical survey conducted in the East Housing area in 2006 detected 17,568 anomalies, 7,716 of which were designated as targets of interest bearing further investigation (Metcalf & Eddy 2007). Since all of the residences in this area are Capehart units that were constructed during the early 1960s, they are aging and do not meet Air Force housing standards (Parsons 2005). If any MFH were to be located here, all the Capehart units would need to be demolished and replaced with new construction. Before that could occur, any potential UXO would need to be removed. There is currently no funding for UXO remediation at this location. The condition of the residences and the possible presence of UXO were also the reasons why the U.S. Department of Housing and Urban Development declined these units as potential low income housing under the McKinney-Vento Homeless Assistance Act. Lastly, the 114-acre expansion area was eliminated from the project footprint, also because of the possible presence of UXO as well as the confirmed presence of Gaviota tarplant (*Deinandra increscens* ssp. *villosa*), which is federally and state listed as an endangered plant species. Therefore, only the West Housing area is within the current project footprint and is the only housing area considered in this EA; this area is shown in Figure 1-2.

West Housing has been divided into Parcel A and Parcel B. Parcel B is an area of approximately 4 acres located north of Korina Avenue, Baywood Street, and Fidler Street. This parcel has been designated as a Cultural Area based on the discovery of archaeological resources there. Parcel A, approximately 454 acres, comprises the remainder of West Housing.

1.3 PURPOSE AND NEED FOR THE PROPOSED ACTION

For decades, spending on military housing was given a lower priority than spending on other defense needs. In the absence of funds needed for maintenance, older housing units on military installations fell into disrepair, affecting service member morale. In addition, at many installations the demand for adequate on-base housing exceeded supply. The lack of adequate MFH has forced many airmen and their families to live in housing that is in need of repair, renovation, or replacement, or to live off-base, where the cost and quality of housing vary considerably. Compounding the problem in some cases is the cost of off-base housing, which can be as much as 15 to 20 percent higher than the cost of living on-base. This can present a financial hardship for many military families, particularly those of junior enlisted members.

Although on-base housing shortages exist at many installations, there are others where there is an excess of housing units. Where funds are available at some installations, they are being used for maintaining housing units that are excess to the military's needs. In 2000, DOD identified that 9,000 housing units (out of 290,000) were being maintained even though they were not needed (Office of Management and Budget 2001).

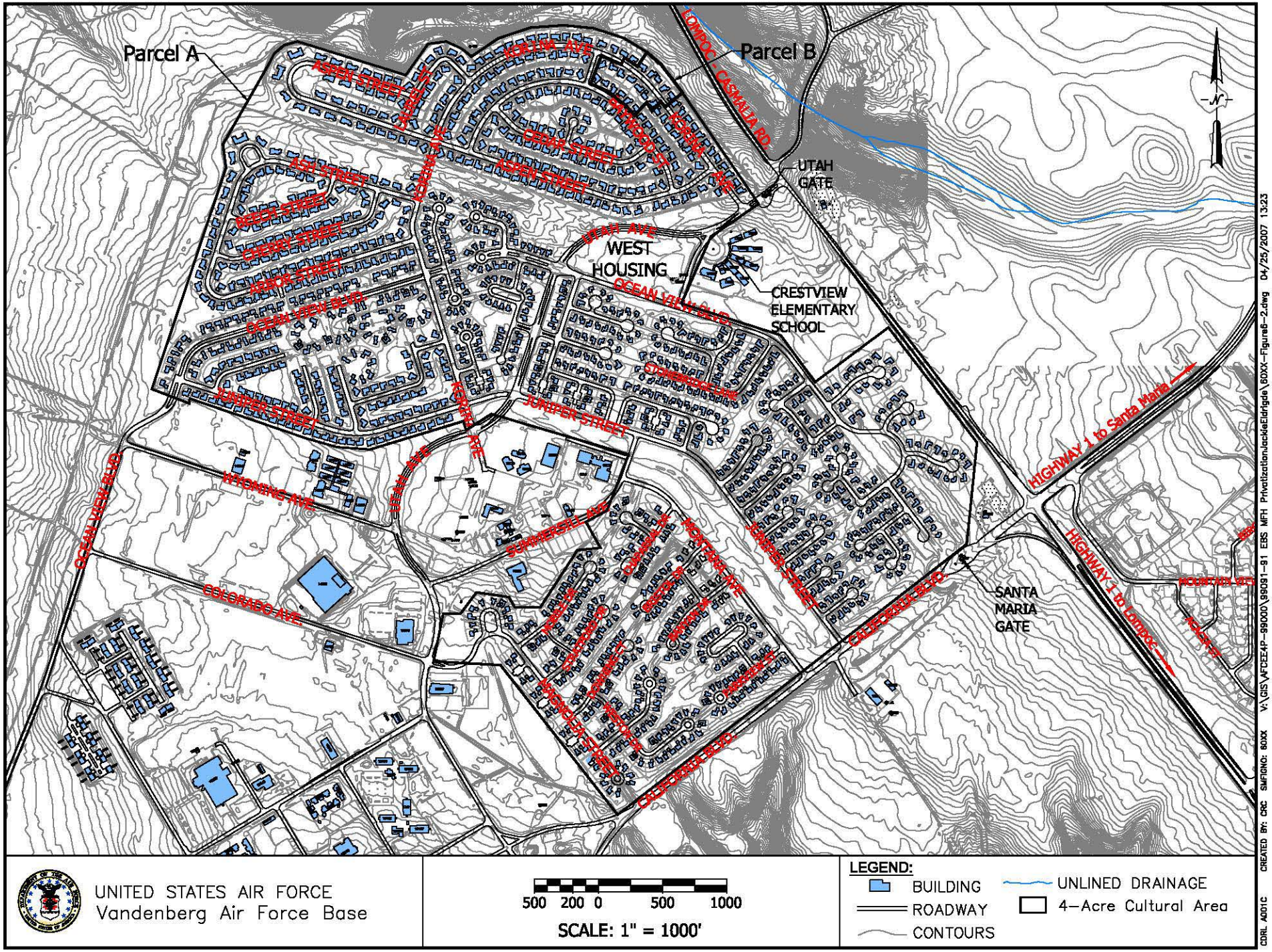


Figure 1-2 Map of West Housing Area

The deteriorating condition of MFH came to the forefront in the mid-1990s, when the Department of Defense estimated that 60 percent of military housing units were inadequate. In 1996, prompted by the need to improve both on-base living conditions and service member morale, Congress enacted Section 2801 of the 1996 Defense Authorization Act (Public Law 104-106, codified at Title 10 of the United States Code Sections 2871–2885). Also known as the Military Housing Privatization Initiative (MHPI), this provision of law creates alternative authorities for improvement and construction of MFH.

In enacting these additional authorities, it was the legislative intent of Congress to enable the military to obtain private sector funding to satisfy family housing requirements. By leveraging scarce public funding, the Air Force can obtain private sector funds for construction, maintenance, management, renovation, replacement, rehabilitation, and development of Air Force MFH and ancillary supporting facilities.[1] The initial deadline set by the Office of the Secretary of Defense (OSD) for DOD services to eliminate inadequate housing from their inventories was fiscal year (FY) 2010. However, in 2002, the OSD accelerated that goal from FY 2010 to FY 2007.

Privatization of military housing shifts the responsibility for housing construction and management from the government to the private sector and has been successful in providing better quality housing for the military at a lower cost to the government. Under the MHPI, private sector developers own, operate, maintain, improve, and assume responsibility for military housing, provided the arrangement is economically feasible.

Initial response to the MHPI was slow; by the end of 2000, a total of only 5,894 housing units had been privatized. After 2000, however, DOD began to accelerate the pace of housing privatization projects. By the end of FY 2004, the number of privatized units had jumped to 64,389, but there were still an estimated 117,615 units that were considered inadequate. Continued efforts are expected to dramatically reduce the number of inadequate units in the military's inventory. Ultimately, the government plans to privatize a cumulative total of over 185,000 units, or 84 percent of its U.S.-based housing inventory, by the end of 2007 (Grone 2005).

1.3.1 Purpose of the Proposed Action

Consistent with the MHPI authorities, the purpose of MFH privatization at Vandenberg AFB is twofold. First, it is intended to improve the condition of DOD-owned housing through renovation or replacement. Housing conditions affect the morale of service members and their families, and improvements in housing are reflected in improved morale and quality of life for these individuals and increased readiness and retention among the military community.

Second, privatization fills the gap created by shortages in affordable housing within the local community. DOD maintains a "community first" policy, meaning that the first choice for housing service members is within the private sector. By finding housing in nearby cities and towns, military members and their families are more likely to become part of—and have a positive influence on—the local community. DOD also believes that private sector housing also offers a safe, secure living environment for its personnel (MFH FAQs 2006). However, on-base housing is needed when there is a shortfall of affordable housing within the community.

[1] According to 10 U.S.C. 2871, the term *ancillary supporting facilities* means "facilities related to military housing units, including child care centers, day care centers, tot lots, community centers, housing offices, dining facilities, unit offices, and other similar facilities for the support of military housing."

An added benefit is that privatization replaces the traditional approach to military construction with commercial construction and funding. The advantage of this approach is that it results in the construction of more housing units—faster—than would be possible with the same amount of federal funding. In other words, commercial construction can be achieved in less time and at lower cost than military construction.

At Vandenberg AFB, the goals of privatized military housing can be summarized as follows:

- Ensure that eligible airmen and their families have access to quality, attractive, and affordable housing by upgrading inadequate existing family housing through renovation and/or replacement.
- Improve the appearance and functions of the residential community while meeting environmental stewardship responsibilities.
- Provide ancillary supporting facilities that enhance the Vandenberg AFB residential community.
- Maintain positive relations with nearby communities through public meetings and public news media.
- Provide for the effective management and operating of existing, renovated, and new housing units and ancillary supporting facilities on a long-term basis.

1.3.2 Need for the Proposed Action

The Proposed Action is needed to support the Air Force goal of providing an adequate supply of on-base housing that is constructed and maintained to meet DOD standards and to meet this goal by the OSD-established deadline of FY 2007.

Military use of the area currently encompassed by Vandenberg AFB dates back to October 1941 when it was officially activated as Camp Cooke and served as an Army training facility for the armored and infantry troops preparing to enter World War II. Camp Cooke was closed in 1946, reopened from 1950 to 1953 during the Korean conflict, and reopened by the Air Force four years later. At that time, the area now occupied by West Housing was the location of barracks, dining halls, latrines, and a portion of a motor vehicle storage and maintenance area for the former Camp Cooke. These barracks and vehicle maintenance sheds were replaced with Capehart housing units between 1959 and 1961 to satisfy the housing needs of families stationed at Vandenberg AFB. Figure 1-3 shows an example of Capehart housing.

Figure 1-3 Example of a 3-Bedroom Capehart Housing Unit in the West Housing Area

In the mid-1990s, a program was implemented for the phased replacement of the existing housing with newer structures (called MILCON replacement units) that would comply with existing MFH standards and reduce the costs associated with maintaining the older structures. As a result, the West Housing area consists of a mix of 501 of the original Capehart units constructed between 1959 and 1961 and some 835 MILCON replacement units constructed after 1995. Figure 1-4 and Figure 1-5 are examples of the MILCON replacement units.

Figure 1-4 Example of a 2- to 3-Bedroom MILCON Replacement Unit in the West Housing Area

Figure 1-5 Example of a 3- to 4-Bedroom MILCON Replacement Unit in the West Housing Area

Table 1-1 shows the current housing inventory of West Housing; this is the inventory that would be conveyed to the PO under the privatization project. The Capehart units, because of their age and deteriorating condition, do not meet Air Force standards for acceptable housing and are scheduled to be demolished. In addition, a number of the MILCON units have been scheduled for renovation to bring them back up to Air Force standards. New units would be constructed to meet the MFH housing needs at Vandenberg AFB, based on projected demographics. Those of the MILCON units not scheduled for renovation would be considered excess units, and the PO would have the option of either retaining them as additional housing or demolishing them.

Table 1-1
Current Housing Inventory by Parcel

Housing Area	Type of Unit	Number of Units	Construction Dates
Parcel A (Housing)	Capehart	483	1959–1961
Parcel A (Housing)	MILCON	835	1995–2002
Parcel B (Cultural Area)	Capehart	18	1959–1961
Parcel B (Cultural Area)	MILCON	0	1995–2002

A Housing Community Profile (HCP) was conducted to assess the condition of both the housing and the infrastructure within the neighborhoods comprising West and East Housing on Vandenberg AFB. In accordance with AFI 32-6007, *Privatized Family Housing*, and the *U.S. Air Force Family Housing Guide* (U.S. Air Force 2004), the purpose of the HCP is to document the condition of the family housing, identify construction requirements needed to bring the housing and communities up to Air Force standards, and evaluate whether improvement or replacement would be the most economical decision.

The HCP "represents the minimum military housing construction requirements and is the basis for privatization project development decisions" (U.S. Air Force 2005). The revised 50 percent submittal of the HCP was released in March 2005 (Parsons 2005).

The Air Force evaluates the condition of military family housing using a scoring method called the Condition Assessment Matrix (CAM). The CAM score provides an indication of the current condition of representative housing units and is based on a survey of more than 118 components of the community, infrastructure, and housing units within the housing area. Evaluations are based on appearance, condition, functionality, expansion capacity, life expectancy, energy compliance, and life/safety compliance. Each component receives a CAM score from 1 to 5, with 5 being excellent. The CAM scoring system is as follows:

- Excellent: 4.20 to 5.00 (exceeds Air Force standards)
- Good: 3.75 to 4.19 (meets Air Force standards)
- Fair: 2.70 to 3.74 (below Air Force standards, needs minor maintenance/repair)
- Poor: 2.00 to 2.69 (below Air Force standards, needs moderate maintenance/repair)
- Deteriorated: 1.00 to 1.99 (below Air Force standards, needs major maintenance/repair)

An acceptable residence is one that meets modern standards, i.e., has a CAM score of 3.75 or higher. The West Housing area consists of neighborhoods A through F; each neighborhood was evaluated and given CAM scores. Table 1-2 provides a summary of the results.

Table 1-2
CAM Scores for West Housing (as of October 2004)

Existing Housing Area	Number of Units	Year(s) Constructed	Construction	CAM Score
Neighborhood A (Parcel A)	486	1995–1998	MILCON	3.73
Neighborhood B (Parcel A)	83	2002	MILCON	5.0
Neighborhood B (Parcel A)	108	1959–1961	Capehart	2.83
Neighborhood C (Parcel A)	139	1959–1961	Capehart	2.9
Neighborhood D (Parcel A)	266	1998	MILCON	3.77
Neighborhood E (Parcel A)	187	1959–1961	Capehart	2.78
Neighborhood F (Parcel A)	49	1959–1961	Capehart	2.95
Neighborhood E (Parcel B, Cultural Area)	18	1959–1961	Capehart	2.78
Total	1,336			

Source: Parsons 2005.

Since traditional MILCON funds are not available within the required time frame for accomplishing this project, privatization has been determined to be the best solution.

1.4 ENVIRONMENTAL IMPACT ANALYSIS PROCESS

The NEPA established a national policy to protect the environment and ensure that federal agencies consider the environmental effects of actions in their decision-making. The CEQ is authorized to oversee and recommend national policies to improve the quality of the environment. The CEQ published regulations that describe how NEPA should be implemented. The CEQ regulations encourage federal agencies to develop and implement procedures that address the NEPA process in order to avoid or minimize adverse effects on the environment. Title 32 CFR Part 989 addresses implementation of NEPA as part of the Air Force planning and decision-making process. AFI 32-7061, *Environmental Impact Analysis Process*, incorporates 32 CFR Part 989 by reference.

Air Force NEPA guidance provides for public participation in the NEPA process. If the analysis conducted for this EA concludes there would be no significant environmental effects from implementing the proposed project, Vandenberg AFB may issue a draft Finding of No Significant Impact (FONSI). After the draft FONSI is issued, there would be a 30-day public comment period, during which agencies and the public may submit comments on the proposed project, the EA, or the draft FONSI. All comments would be considered. If, however, the analysis conducted for this EA concluded that significant effects would be likely, the Air Force would issue a Notice of Intent to prepare an Environmental Impact Statement.

1.5 STRUCTURE OF THIS EA

This EA analyzes and describes the potential environmental impacts that could result from the Proposed Action and Alternatives. As appropriate, the consequences of the actions on the affected environment are presented in terms of regional and site-specific descriptions.

Section 2.0 of this EA describes the Proposed Action, Alternatives, and No-Action Alternative. In addition to providing project information, this section describes the general parameters associated with the Proposed Action.

Section 3.0 provides regional and site-specific information related to air quality; cultural resources; geology and soils; hazardous materials and waste management; land use; natural resources; noise; police, fire, and emergency services; safety and occupational health; socioeconomic factors; solid waste; traffic and transportation; utilities; and water resources. The regional information included in this section provides the background for understanding the context of the site-specific information that could affect or be affected by the Proposed Action.

Section 4.0 addresses the potential effects of the Proposed Action on the resource areas analyzed. Possible impacts of project activities are analyzed, the significance of each impact is identified in each resource area, and management measures, if required, are so stated.

Sections 5.0 through 8.0 identify, respectively, references cited, persons and agencies contacted, preparers, and acronyms and abbreviations used in this EA.

Appendix A contains the air quality conformity analysis, Appendix B is the cultural resources report, and Appendix C contains copies of correspondence related to cultural and natural resources.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

The Air Force plans a non–Federal Acquisition Regulation real estate transaction under which it would lease land and convey existing housing located on Vandenberg AFB to a privatization contractor, referred to here as the Project Owner (PO). Included in the conveyance would be 1,336 existing family housing units and certain associated improvements. The existing elementary school and other community facilities in the West Housing area would not be included in any lease agreement between the Air Force and the PO. The housing units are located on approximately 458 acres of government-owned land comprising two parcels: Parcel A is approximately 454 acres and Parcel B is approximately 4 acres. Both parcels would be leased to the PO for a 6-year transition period (called the Initial Development Period).

During the Initial Development Period, the PO would undertake replacement, renovation, new construction, modernization, or demolition that would make available 867 family housing units and related infrastructure that are in an acceptable condition and that meet the project development demographics. Housing units thus made available by the PO would be provided as a rental community primarily to the Vandenberg AFB military members and their families. New units would be a combination of single family and multiplex units having two, three, or four bedrooms. As part of the project requirements, all housing units on Parcel B (Cultural Area) would be demolished; there would be no new construction on this parcel.

At the conclusion of the Initial Development Period, Parcel B would be returned to the Air Force and the lease of that parcel would be terminated. The lease of Parcel A would be continued for an additional 44 years, for a total lease period of 50 years. During the lease, the land would remain under exclusive federal jurisdiction, meaning that it would continue to be owned by the federal government.

On Parcel A, the Air Force intends for the PO to demolish some existing units, refurbish other existing units to meet Air Force standards, and construct a sufficient number of new units to meet the minimum total end state number of 867 housing units. The PO would also be responsible for long-term maintenance and management of these units and associated infrastructure.

2.1.1 Local Housing Market

The housing market area for Vandenberg AFB is defined as the area within "a one-hour commute time from the installation's headquarters building (Building 10577) during peak traffic in privately owned vehicles assuming normal weather conditions or twenty miles distance from the installation's headquarters building, whichever is greater" (SAIC 2006). This area includes Lompoc, Solvang, Buellton, Santa Ynez, Los Alamos, Mission Hills, Vandenberg Village, Orcutt, Santa Maria, and Guadalupe in Santa Barbara County and Nipomo in San Luis Obispo County. The majority of Vandenberg AFB military families living in off-base housing reside in Lompoc or Santa Maria.

The annual growth rate of the local housing supply is estimated at 0.9 percent, and by 2011, the rental housing supply is expected to increase to 25,492 units. Rental market vacancies are estimated to be 5 percent. An estimated 61.5 percent of those are projected to be suitable for military families (SAIC 2006).

2.1.2 Vandenberg AFB Housing Needs

The current allocation (consisting of both East and West Housing areas) and anticipated demand for housing on Vandenberg AFB, by pay grade, is shown in Table 2-1. As determined by the HRMA, by 2011, "authorized manpower is expected to increase to 3,350, with 1,995 military families and 1,156 military bachelors requiring housing." Based on this change in Vandenberg AFB manpower and the projected availability of housing in the local area, the HRMA concluded there would be a private sector shortfall of 611 housing units and an MFH requirement of 867 units by 2011. For unaccompanied personnel, there would be a private sector shortfall of 239 housing units and a requirement for housing 771 unaccompanied personnel on the base (SAIC 2006).

Table 2-1
Current Allocation and Anticipated Housing Demand on Vandenberg AFB

	2-Bedroom Modified Units		3-Bedroom Units		4-Bedroom Units	
Pay Grade	**Current Allocation (2006)**	**Anticipated Demand (2011)**	**Current Allocation (2006)**	**Anticipated Demand (2011)**	**Current Allocation (2006)**	**Anticipated Demand (2011)**
O-7 to O-10 (General Officer)	0	0	0	0	3	2
O-6 (Senior Officer)	0	0	0	0	21	14
O-5	0	0	60	27	81	9
O-4	0	0	61	8	92	8
O-3	0	27	154	15	191	15
O-2	0	3	7	0	9	1
O-1	0	13	14	2	17	6
E-9	0	0	7	0	7	14
E-8	0	0	21	5	25	3
E-7	0	0	114	30	139	14
E-6	75	49	300	24	516	30
E-5	152	108	367	195	624	86
E-4	87	62	76	38	184	18
E-3	17	18	10	7	27	0
E-2	9	5	0	0	9	0
E-1	24	11	0	0	24	0
Total	364	296	1,191	351	1,969	220

Source: SAIC 2006.

2.2 DESCRIPTION OF THE PROPOSED ACTION

The Proposed Action is the lease of approximately 458 acres of land and conveyance of 1,336 family housing units for privatization. Other improvements, including playgrounds, pavements, street lighting, and landscaping in the housing area would also be conveyed. The PO would demolish all 501 Capehart housing units, renovate 703 of the MILCON units to bring them up to Air Force standards, and construct 164 new units to achieve a final end state of 867 housing units. The new construction would consist of 150 officer residences and 14 Prestige (E-9) units. The remaining 132 MILCON units would be excess, and the PO would have the option of either demolishing them or retaining them as additional rental housing. For purposes of this EA, it is assumed the PO would retain these units. All demolition, renovation, and construction would occur during the Initial Development Period (i.e., during the first 6 years of the lease). Housing would still be categorized by grade group (for example, junior noncommissioned officer, senior noncommissioned officer, company grade officer).

Table 2-2 provides an overview of the demolition, renovation, and construction activities. During the 6-year Initial Development Period, families in older units would be relocated into remaining units in the East Housing area and/or newly constructed or renovated units in phases. Throughout the Initial Development Period, the PO would be responsible for ensuring there are a minimum of 867 residences available for occupancy. Figure 2-1 shows the general concept for the Proposed Action.

Table 2-2
Overview of the Proposed Action

Activity/Type of Unit	Number of Units
Conveyance	
Capehart	501
MILCON	835
Total	1,336
Demolition	
Capehart	501
MILCON	0
Total	501
Renovation	
Capehart	0
MILCON	703
Total	703
Construction	164
Total End Inventory	867

Housing units would be grouped to form a network of neighborhoods within the community, with no more than six duplex or multiplex units per acre and not more than four single-family units per acre. Buildings would be placed in informal arrangements, with varying setbacks, and would be situated for best view, privacy, and variety. Passive energy efficiency would also be considered in the overall neighborhood design and placement of buildings. Safety considerations would include minimizing terrorist impacts, minimizing access from surrounding communities, and protection against crime. Landscaping, recreational areas, common open space, pavilions, walkways, and bicycle and jogging trails

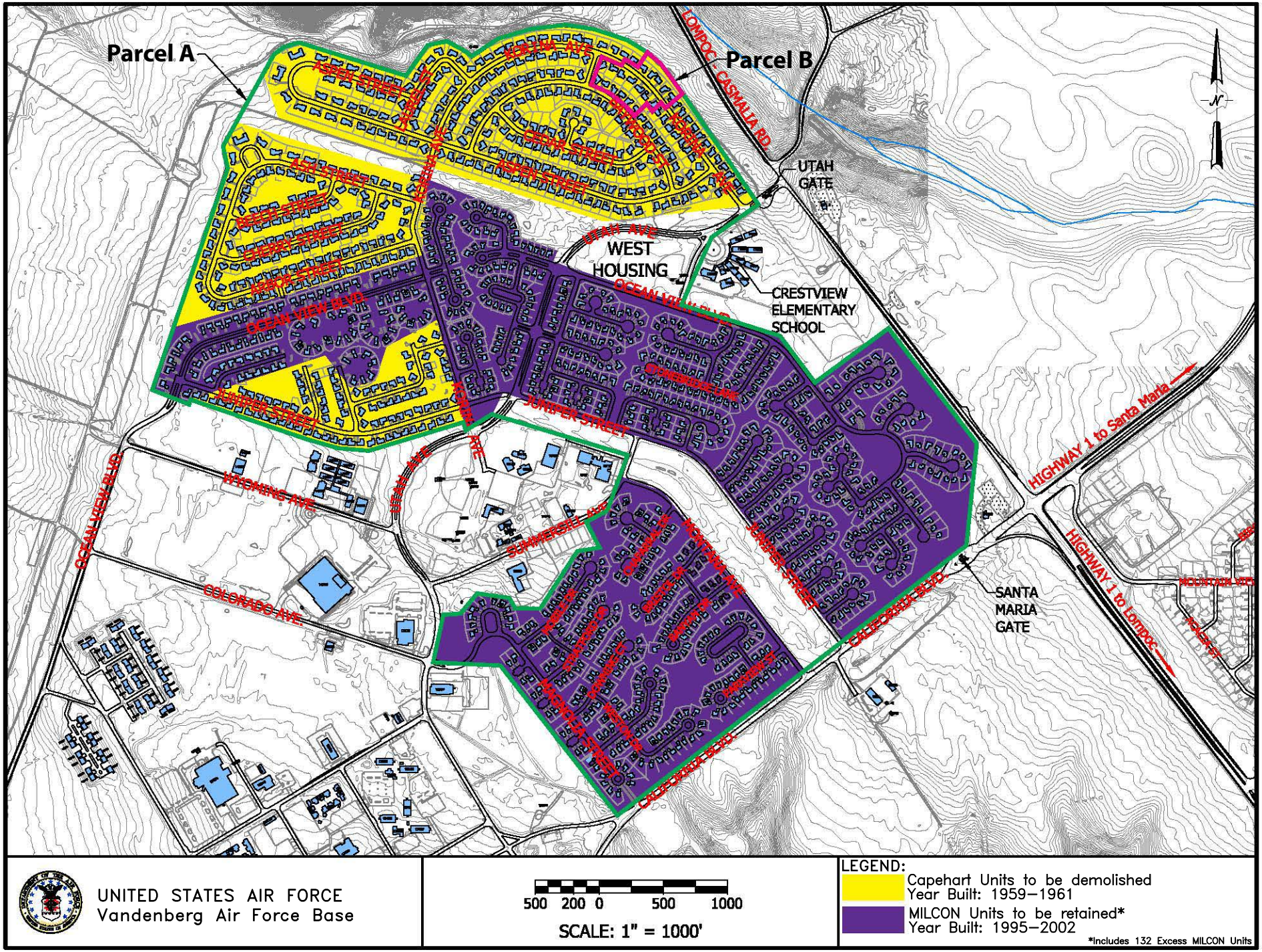


Figure 2–1 Proposed Action Concept

would be included and would be designed to be accessible. A management office would also be constructed in the housing area.

At least 5 percent of the total end state number of housing units would be either handicap accessible or readily adaptable to be accessible in accordance with the Americans with Disabilities Act Accessibility Guidelines and other applicable laws.

Air Force personnel would receive their Basic Allowance for Housing (BAH), less a 110 percent utility allowance, and would pay rent to the PO. The utility allowance is the estimated amount that the family would pay each month for utility consumption (e.g., gas, electric, telephone), increased by 10 percent. Tenants in the privatized housing units would be responsible for paying their utility costs; that is, they would pay directly to the utility provider.

Vandenberg AFB would not guarantee for the PO the level of occupancy of the housing units; rather, the PO would be responsible for ensuring a sufficient occupancy level to maintain a profitable business. Under special circumstances the PO could rent vacant family housing units to tenants other than service members with dependents in accordance with the MHPI goals and objectives and under a specified "waterfall" of prospective tenants. In such cases, the final determination whether to lease the residence would be made by the installation commander.

Along with the existing housing, the conveyance would include all associated existing pavements, street lighting, playgrounds, and landscaping. Paved areas include streets, median strips, driveways, curbs, gutters, sidewalks, and parking lots. Installation of any new utility services or relocation of any existing utility services would be done by the PO. All new outside utility lines would be placed underground.

The electric, water, natural gas, sewer, and storm drain systems servicing Parcels A and B would also be conveyed to the PO. Exceptions would be made for the large (18- to 21-inch) water mains and the other utility lines (gas, electrical, sewer) that pass through and/or do not directly serve the housing area. Ownership of these lines would be privatized under a separate arrangement.

The Air Force and the PO would develop a utility program that promotes energy conservation and reduced utility consumption. Under this program, the PO would be responsible for all costs of utilities provided to common areas of the project and all vacant units during the entire project period. The PO would also be responsible for all utilities in occupied housing units covered by the project. Furthermore, the PO would be responsible for all utilities in occupied housing units covered by the project until the units have been renovated or replaced, utility meters (electricity, gas, and/or oil) have been installed, and a 12-month consumption record has been established. When these three conditions are met in an entire housing area and appropriate notice is provided to each service member occupant, the service member will become responsible for the cost of utilities (electric, gas, and oil) for his or her residence.

Fire, law enforcement, and emergency services would continue to be provided by Vandenberg AFB. Included in these services would be emergency response, force protection, and preventive maintenance. The PO would reimburse Vandenberg AFB for all actual costs of providing these services.

Refuse collection, recycling services, grounds maintenance, and housing maintenance is currently performed by contractors. The PO would be responsible for ensuring these services continue to be provided.

Overhead and underground telephone lines and associated equipment (owned by Verizon), government-owned computer network lines, overhead and underground television cable lines (owned by Vandenberg

Broadband), and government telephone cable systems providing secured-line service to the General Officer Quarters (GOQ) units would not be conveyed to the PO. The existing underground conduit for utility lines and supporting equipment for overhead lines (e.g., telephone poles) is owned by the government and would be conveyed to the PO.

Demolition, renovation, and new construction would take place in a phased approach throughout the Initial Development Period. Although the actual number of units to be demolished, renovated, or constructed each year is unknown, it is reasonable to assume that a sufficient number of units will need to be retained to accommodate the housing needs of the base and to ensure there are a minimum of 867 available residences. A feasible scenario is shown in Table 2-3.

Table 2-3
Units to be Demolished, Renovated, and Constructed Under the Proposed Action

Activity	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total
Total units conveyed							1,336
Demolition	130	130	130	111			501
Renovation		150	150	150	150	103	703
Construction				60	60	44	164
Total units available (less excess units)	1,074	944	814	763	823	867	
Retained MILCON units	132	132	132	132	132	132	

2.2.1 Demolition of Existing Units

Under the Proposed Action, the PO would be required to demolish the 501 existing Capehart housing units, which were constructed between 1959 and 1961. These are single-story structures with single-car garages; construction is wood frame structure with exterior plaster, board and batting, and stone/masonry veneer. They are built on concrete slabs and have asphalt composition roofs.

In addition, the PO would remove all roads and fences scheduled for demolition as well as all aboveground utilities. The PO would employ a phased approach to demolition, which would be described in a demolition plan. Demolition activities would take place during the Initial Development Period, years 1 through 6 of the lease; all of the Capehart units would be demolished before the end of the sixth year after the transaction closing.

Both lead-based paint (LBP) and asbestos-containing materials (ACM) are known to be present in the Capehart housing units, and abatement of these materials would be required during demolition activities. Ballasts in fluorescent lighting fixtures in these units may contain polychlorinated biphenyls (PCBs). Lead is known to be present in the glaze on ceramic tile used in the bathrooms.

Based on previous phases of construction and demolition in the West Housing area, demolition is assumed to last an average of 18 weeks per phase. Demolition would occur in two steps. First, crews would remove asbestos, LBP, and recyclable materials such as appliances and windows. Following abatement and salvage activities, the houses would be demolished. Equipment required for demolition

would include track loaders, track hoes, bulldozers, water trucks, dump trucks, and pickup trucks (Table 2-4).

Table 2-4
Demolition and Construction Estimates (per 100 housing units)

Activity	Worker Type	Worker Weeks	Heavy Equipment Type	Equip. Weeks	Hauling Type	Hauling Trips
Demolition						
6 weeks: Asbestos & lead-based paint abatement	Building laborer	114	Pickup truck 40-foot dumpster	12 6	Heavy duty diesel powered vehicle	6
6 weeks: House demolition	Equipment operator Truck driver Supervisor	24 24 12	Track loader Bulldozer Track hoe Water truck Dump truck	6 6 6 6 24	Dump truck	735
Site grading 4 weeks	Equipment operator Truck driver	20 8	Scraper Track loader Bulldozer Track hoe Dump truck	8 4 4 4 8	Dump truck	0
Road & utility construction 4 weeks	Equipment operator Truck driver Construction laborer	12 12 20	Skid steer loader Paver Road grader Asphalt truck	4 4 4 12	Asphalt truck	50
House construction 25 weeks	Equipment operator Truck driver	240 160	Backhoe Cement truck Trencher Forklift Wheel trencher Scraper Skid steer loader	80 160 20 80 20 20 20	Cement truck	360
	Construction laborer	4,250			Heavy duty diesel powered vehicle	500
Totals for all activities	Total Worker Weeks	4,896	Total Weeks	518	Total Trips	1,651
45 weeks	Average workers per week	108.8				

Source: Halliburton NUS 1996.

2.2.2 Renovation of Existing Units

The Proposed Action would also include renovation of 703 existing MILCON housing units. The MILCON units are one- or two-story structures with attached two-car garages; construction is wood frame with stucco exterior. They are built on concrete slabs and have concrete tile roofs.

The PO would be required to meet basic requirements for square footage, incorporate innovative design features, and comply with all applicable codes, standards, and regulations. Some of the desired features in the renovated units are

- Additional square footage above programming benchmark;
- Access to front and rear of unit through house and garage;
- More single-family units rather than multiplex units;
- Modification to 2-car garages for all units;
- Walk-in clothes closets with custom storage units;
- Double sinks and larger tubs in bathrooms;
- More two full baths instead of 1 3/4 baths, where feasible;
- Programmable thermostats;
- Laundry room with counter and sink;
- Built in microwave;
- Ceiling fans with light fixtures;
- Overhead lighting in all rooms, switched on at the entry door;
- Upgraded communication lines (Cat 5 phone/R6 quad shield coaxial); and
- Replace fencing (matching style) as needed for each unit.

2.2.3 Construction of New Units

To reach the desired end state of at least 867 housing units, the PO would construct 164 new units. All the existing housing units within West Housing are single-family residences. The PO may, however, elect to include multiplex units as part of the new construction. Multiplex units would have no more than six dwelling units per building; no stacked units would be constructed.

Each single family unit would have a two-car garage and each attached unit would have a one-car garage; additional parking would be provided throughout each neighborhood at a ratio of one guest parking space for every two units, except for GOQ, Senior Officer Quarters (SOQ), and Prestige units. At least 12 guest vehicle parking spaces would be available for the Prestige unit neighborhood, eight guest vehicle spaces for the GOQ unit, and two guest vehicle spaces for each SOQ unit.

New construction would include design, materials, equipment, and construction to reduce energy and water consumption and meet Energy Star criteria. Soil around new foundations would be treated for termites in accordance with state law and the Vandenberg AFB Pest Management Plan. In addition, materials, equipment and finishes would be selected that are low maintenance, aesthetically pleasing, and durable. For example, basic features would include copper plumbing, dual-pane insulated windows and

patio doors, and overhead lighting in bedrooms and closets. GOQ, SOQ, and Prestige units would have individual mailboxes; all other housing units would have cluster mailboxes. Other features of the new housing units would be as described under Renovation, with the following additions:

- More three bedroom units in lieu of "two bedroom modified" units;
- Microwave or combination microwave/convection oven built into cabinetry, with ventilation hood beneath (when microwave is located over stovetop); and
- Fireplace.

Construction standards to be applied to family housing would reflect consideration of both military specifications and local community building codes. Construction of housing units would be based on sustainable design and development concepts and would seek to incorporate consideration of matters such as sustainable sites, water efficiency, energy and atmosphere, materials and resources, and indoor environmental quality. These measures would improve environmental and economic performance of facilities through the use of established and advanced industry principles, practices, materials, and standards.

New family housing and ancillary supporting facilities must adhere to the Uniform Federal Accessibility Standards and the Americans with Disabilities Act Accessibility Guidelines promulgated by the Access Board (formerly known as the Architectural and Transportation Barriers Compliance Board) pursuant to the Architectural Barriers Act of 1968, Rehabilitation Act of 1973, and Americans with Disabilities Act of 1990. These standards require that at least 5 percent of new family housing be designed and built to be accessible, or easily modifiable for access, by persons with physical disabilities.

All newly constructed units would have individual electric and natural gas meters. Utilities would be connected to a utility provider by the end of the Initial Development Period. All the units would also be pre-wired for cable television and telephone jacks. Outside utility lines would be placed underground.

2.3 ALTERNATIVE 1

Under Alternative 1, the PO would demolish all of the Capehart units and all of the MILCON units except the 83 MILCON units in Neighborhood B, which were constructed in 2002; those 83 units would be renovated. To achieve the final end state of 867 units, the PO would construct 784 new housing units. The 132 excess MILCON housing units would not be retained; they would be demolished. Table 2-5 shows an overview of the demolition, renovation, and construction that would occur under Alternative 1.

2.3.1 Demolition of Existing Units

During the Initial Development Period, the PO would demolish the 501 existing Capehart housing units, as well as 835 MILCON units (Table 2-6). Similar to the Proposed Action, the PO would remove all roads and fences scheduled for demolition as well as all aboveground utilities. The PO would employ a phased approach to demolition, which would be described in a demolition plan. All demolition would be completed by the end of the sixth year after the transaction closing.

Both LBP and ACM are known to be present in the Capehart housing units, and abatement of these materials would be required during demolition activities. Ballasts in fluorescent lighting fixtures in these units may contain PCBs. Lead is known to be present in the glaze on ceramic tile used in the bathrooms.

Table 2-5
Overview of Alternative 1

Activity/Type of Unit	Number of Units
Conveyance	
Capehart	501
MILCON	835
Total	1,336
Demolition	
Capehart	501
MILCON	752
Total	1,253
Renovation	
Capehart	0
MILCON	83
Total	83
Construction	784
Total End Inventory	867

Table 2-6
Units to be Demolished, Renovated, and Constructed Under Alternative 1

Activity	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total
Total units conveyed							1,336
Demolition	200	200	200	230	230	193	1,253
Renovation						83	83
Construction		180	180	180	180	64	784
Total units available	1,136	1,116	1,096	1,046	996	867	
Retained MILCON units	0	0	0	0	0	0	

2.3.2 Renovation of Existing Units

Alternative 1 would also include renovation of 83 existing MILCON housing units. The MILCON units are one- or two-story structures with attached two-car garages; construction is wood frame with stucco exterior. They are built on concrete slabs and have concrete tile roofs.

The PO would be required to meet basic requirements for square footage, incorporate innovative design features, and comply with all applicable codes, standards, and regulations. The features in the renovated units would be the same as described for the Proposed Action.

2.3.3 Construction of New Units

To reach the end state of 867 housing units, the PO would construct 784 new units. These units could be all single family dwellings or a combination of single family and multiplex units. Features of the new construction, including design, materials, and parking arrangements, would be as described for the Proposed Action.

All newly constructed units would have individual electric and natural gas meters. Utilities would be connected to a utility provider by the end of the Initial Development Period. All the units would also be pre-wired for cable television and telephone jacks. Outside utility lines would be placed underground.

As under the Proposed Action, the PO would take a phased approach to the demolition, renovation, and construction activities.

2.4 NO-ACTION ALTERNATIVE

The CEQ regulations require inclusion of a No-Action Alternative in an EA. The No-Action Alternative serves as a baseline against which the impacts of the Proposed Action and Alternatives can be evaluated.

Under the No-Action Alternative, there would be no privatization of the West Housing area. The property would not be leased, and Vandenberg AFB would continue to provide for the family housing needs of its personnel through use of traditional military maintenance and construction procedures. The housing units on the property would be maintained in their current state. There would be no demolition of older units, renovation of newer units, or construction of replacement units. The 4-acre cultural site (Parcel B) would also remain in its current state and the residences on that parcel would remain in place.

Vandenberg AFB would continue to obtain funding for family housing through the Congressional authorization and appropriation process. Based on historical trends, it is assumed that the amount of Congressional funding for family housing would not change and that the housing maintenance backlog would continue to increase. Any major changes to existing housing or construction of new housing would require that appropriate NEPA analyses be completed before such actions are implemented.

2.5 ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

2.5.1 Partial Privatization Alternative

Under the Partial Privatization Alternative, Vandenberg AFB would subject only a portion of the installation's family housing to the MHPI. Family housing in good condition (not needing demolition or renovation) would remain subject to Air Force management for maintenance and operational control.

Privatization of only a portion of Vandenberg AFB's family housing inventory would have three substantial drawbacks. First, the condition of the family housing retained by the Air Force would change over time, resulting in a need for its renovation or replacement. Failure to include the entire inventory of housing in the MHPI would only delay action to provide adequate housing for airmen and their dependents. Second, two management regimes (the Air Force's and the PO's) would not be as cost-effective as one. From a PO's perspective, maximum potential cash flow is also important to support development and operation of the ancillary supporting facilities desired by an installation, activities that traditionally do not provide independent sources of revenue to sustain them. Finally, partial privatization would not fully meet the Air Force's purpose of and need for the proposed action. Together, these factors

render consideration of partial privatization at Vandenberg AFB not feasible, and therefore such an alternative is not evaluated in detail in this EA.

2.5.2 Private Sector Reliance Alternative

Under this alternative, Vandenberg AFB would rely solely on the private sector to meet the housing needs of personnel assigned to the installation. The installation would terminate family housing programs, dispose of existing family housing units, and convert the land now supporting housing areas to other uses.

The alternative is premised, in part, on the view that competitive marketplace forces would lead to the creation of sufficient affordable, quality family housing. Data vary, but in general, experience shows that airmen and their families living off-base must cover between 15 and 20 percent of their housing costs out-of-pocket. Moreover, living on-base has several intangible benefits to airmen and their families. These include camaraderie and esprit de corps among the military personnel, a sense of "family" among dependents (especially during deployments), proximity to the workplace (thereby avoiding lengthy commutes), and airmens' comfort level in knowing that their dependents are residing in a safe community while they are deployed or serving on temporary duty at a distant location.

As a practical matter, termination of Vandenberg AFB family housing would prove difficult. If MFH were to be terminated over a period of years, in the absence of maintenance funding, the existing housing would become unsuitable because of age or necessity of repairs. Residents could then find themselves living in blighted and partially abandoned neighborhoods. If MFH were to be terminated at once, it is unlikely that the private sector could provide the requisite amount of affordable, quality housing units, as well as schools, shops, roads, and other support amenities, on short notice. The Housing Requirement and Market Analysis for Vandenberg AFB indicates a shortfall of approximately 600 suitable housing units to absorb the requirement for housing if Vandenberg relied totally on the private sector for suitable housing for its members (SAIC 2006).

Renovation of many of the family housing units at Vandenberg AFB is economically sound. Termination of family housing programs would involve abandonment of immense investments in those facilities. The various consequences of reliance on the private sector and the management difficulties of effecting termination of Air Force Family Housing would prove challenging. In light of the aggregate value of family housing units amenable to renovation, termination of a family housing construction and maintenance program would gravely contravene the fiscal responsibilities that the Congress expects of the Air Force. For these reasons, this alternative is not reasonable and is not further evaluated in this EA.

2.5.3 Leasing Alternative

Statutory authorities exist for Vandenberg AFB to ensure availability of adequate, affordable housing through use of long-term leases of housing for military family use. Key aspects of the two laws providing these authorities are summarized below.

Long-term leasing of military family housing to be constructed. Family housing obtained through use of this authority, which appears at 10 U.S.C. 2835, is most often referred to as "Section 801 housing." Under this authority, the Air Force may, through competitive contract procedures, have a developer build or renovate (to residential use) family housing units near an installation. Housing units under this authority must meet DOD specifications. The Air Force may then lease the units for use as family housing for a period of not more than 20 years. At the end of the lease term, the Air Force has the option to purchase the housing units from the private developer.

Military housing rental guarantee program. Family housing obtained through use of this authority, which appears at 10 U.S.C. 2836, is most often referred to as "Section 802 housing." Under this authority, the Air Force may award a competitive contract to a private developer or a state or local housing authority to construct or rehabilitate housing on or near an installation having a shortage of housing for personnel with or without accompanying dependents. Under the contract, the Air Force guarantees the occupancy levels of the housing units, at rental rates comparable to those for similar units in the same general market. Housing units under this authority must comply with DOD specifications or, at the discretion of the Service secretary, local building codes. A rental guarantee agreement may not exceed 25 years in duration; it may be renewed only for housing located on government-owned land. The agreement may provide that utilities, trash collection, snow removal, and entomological services be furnished by the Air Force at no cost to the occupant to the same extent such services are provided to occupants of base housing.

Although Air Force–wide there has been only limited experience with either of the foregoing authorities, Vandenberg AFB has relied on Section 801 housing for approximately half of its housing needs since the late 1980s. An important drawback of the Section 801 and Section 802 housing programs is related to what is known as budget "scoring," the method of accounting for federal government obligations as required by the Budget Enforcement Act of 1990. Scoring ensures that all government obligations are accounted for when long-term liability is incurred (during the first year of a project). Scoring guidelines issued by the federal Office of Management and Budget require that a project be fully funded with sufficient budget authority in its first year to cover the government's long-term commitment. In other words, all potential costs associated with long-term leasing or rental guarantee programs must be recognized in the first year, and they must be considered part of the Air Force's total obligational authority (the total monies appropriated by Congress for use by the Air Force in a given year). For some privatization projects, such as military leased housing, the Air Force's obligations for scoring purposes amount to the net present value of the total rent under the lease. These amounts can be nearly as great as the sums required under traditional military construction financing for Air Force-initiated construction of similar facilities.

The Section 801 housing program and Section 802 rental guarantee program only partially address the purpose of and need for the proposed action. Because of the scoring guidelines, the Air Force would obtain very little or no leverage benefit.

The enactment of new authorities in the MHPI suggests Congress's recognition that the drawbacks of Section 801 and Section 802 outweigh the potential benefits to the Air Force. Although use of the authorities in either Section 801 or Section 802 or both would be possible, their use would not be reasonable when compared with the better flexibility and economic advantages of the new authorities offered by the MHPI to the Air Force and military families. The Housing Requirement and Market Analysis for Vandenberg AFB indicates a shortfall of approximately 600 suitable housing units to absorb the requirement for housing if Vandenberg relied totally on the private sector for suitable housing for its members (Vandenberg AFB 2003). Accordingly, the off-base leasing alternative is not further evaluated in this EA.

2.6 COMPARISON OF POTENTIAL ENVIRONMENTAL IMPACTS

Table 2-7 shows a comparison of the potential environmental impacts of the Proposed Action and alternatives for each of the resource areas considered in this EA. A detailed discussion, by resource area, of these potential environmental impacts is presented in chapter 4.

Table 2-7
Comparison of Potential Environmental Impacts of Proposed Action and Alternatives

Resource	Proposed Action	Alternative 1	No-Action Alternative
Air quality	No short-term impacts with appropriate management measures for dust suppression and to minimize NO_x and $PM_{2.5}$ emissions from construction equipment. No long-term impacts.	No short-term impacts with appropriate management measures for dust suppression and to minimize NO_x and $PM_{2.5}$ emissions from construction equipment. No long-term impacts.	No impacts.
Cultural resources	No short-term or long-term impacts with archaeologist monitoring of ground-disturbing activities at all cultural resources sites and Native American monitoring at all cultural resources sites except CA-SBA-3559H. Parcel B would be left as undeveloped land.	No short-term or long-term impacts with archaeologist monitoring of ground-disturbing activities at all cultural resources sites and Native American monitoring at all cultural resources sites except CA-SBA-3559H. Parcel B would be left as undeveloped land.	No impacts with archaeologist monitoring of ground-disturbing activities incidental to routine maintenance and upkeep activities at all cultural resources sites and Native American monitoring at all cultural resources sites except CA-SBA-3559H.
Geology and soils	Potential short-term impacts resulting from soil disturbance. No long-term impacts.	Potential short-term impacts resulting from soil disturbance. No long-term impacts.	No impacts.
Hazardous materials and waste management	No short-term impacts with appropriate storage and use of hazardous materials and appropriate hazardous waste management. No long-term impacts.	No short-term impacts with appropriate storage and use of hazardous materials and appropriate hazardous waste management. No long-term impacts.	No impacts.
Land use	No impacts.	No impacts.	No impacts.

Table 2-7
Comparison of Potential Environmental Impacts of Proposed Action and Alternatives (continued)

Resource	Proposed Action	Alternative 1	No-Action Alternative
Natural resources	Localized short-term impacts to wildlife from construction noise and disturbance. Minimize impacts to vegetation through pre-construction surveys to identify presence of special-status species, nesting birds, or monarch butterflies and avoiding removal of mature trees.	Localized short-term impacts to wildlife from construction noise and disturbance. Minimize impacts to vegetation through pre-construction surveys to identify presence of special-status species, nesting birds, or monarch butterflies and avoiding removal of mature trees.	No impacts.
Noise	Minor short-term impacts from heavy equipment use. No long-term impacts.	Minor short-term impacts from heavy equipment use. No long-term impacts.	No impacts.
Police, fire, and emergency services	No impacts.	No impacts.	No impacts.
Safety and occupational health	In the short-term, potential exposure of workers to lead-based paint, asbestos, fluorescent light ballasts containing PCBs, chlordane in soils, and hazardous substances released from inactive USTs. Potential safety hazards from construction activities involving heavy equipment and added vehicular traffic. No long-term impacts.	In the short-term, potential exposure of workers to lead-based paint, asbestos, fluorescent light ballasts containing PCBs, chlordane in soils, and hazardous substances released from inactive USTs. Potential safety hazards from construction activities involving heavy equipment and added vehicular traffic. No long-term impacts.	Potential health impacts from residents' exposure to lead-based paint and asbestos in Capehart units. Potential safety issues from deteriorated plumbing and wiring systems.
Socioeconomic factors	No impacts.	No impacts.	No impacts.
Solid waste	No impacts.	No impacts.	No impacts.
Traffic and transportation	Potential short-term impacts from construction/demolition-related traffic. No long-term impacts.	Potential short-term impacts from construction/demolition-related traffic. No long-term impacts.	No impacts.

Table 2-7
Comparison of Potential Environmental Impacts of Proposed Action and Alternatives (continued)

Resource	Proposed Action	Alternative 1	No-Action Alternative
Utilities	In the short-term, potential minor impacts from brief service interruptions. No long-term impacts.	In the short-term, potential minor impacts from brief service interruptions. No long-term impacts.	No impacts.
Water resources	Potential short-term impacts from storm water runoff. No long-term impacts.	Potential short-term impacts from storm water runoff. No long-term impacts.	No impacts.

Notes: PCB polychlorinated biphenyl
UST underground storage tank

3.0 AFFECTED ENVIRONMENT

This chapter provides information on the current conditions at Vandenberg AFB (or, where appropriate, all or part of Santa Barbara County) and the West Housing area as it relates to each of the resource areas addressed in this EA. Each of the following sections provides general regional information related to the environment at Vandenberg AFB and site-specific information related directly to the West Housing area. Information on the environmental condition of the project area is also contained in the Environmental Baseline Survey (Tetra Tech 2007).

3.1 AIR QUALITY

Air quality within the Santa Barbara Air Basin is described by the concentration of various pollutants in the atmosphere. Concentrations of these pollutants are affected by the interaction of three factors: the physical characteristics of the air basin, the prevailing meteorological conditions within the air basin, and the amount of pollution emitted into the atmosphere. The interrelationship of these three factors determines the measurable concentration of pollutants in the atmosphere.

The portion of the Santa Barbara Air Basin that would be affected by emissions from the Proposed Action generally includes Vandenberg AFB and the surrounding portions of Santa Barbara County north of the Santa Ynez Mountains.

3.1.1 Regional Climate and Meteorology

The climate at Vandenberg AFB is Mediterranean, or dry summer subtropical. The weather is cool and wet from November through April and warm and dry from May through October. The Pacific Ocean, which borders Vandenberg AFB on the west and south, has a moderating effect on temperature fluctuations. The mean temperature ranges from 54 to 57 degrees Fahrenheit (F). Vandenberg AFB monthly temperature data for 1993, 1994, and 1999 through 2002 are presented in Table 3-1.

Average annual rainfall for Vandenberg AFB ranges from 10.5 to 27.5 inches, most of which falls between November and April. There are usually 40 to 50 days per year with measurable precipitation (i.e., greater than 0.01 inch). Coastal areas, including Vandenberg AFB, experience approximately 30 days per year with 0.10 to 0.49 inch of rain and 10 to 15 days with 0.50 inch or more of rain. Vandenberg AFB monthly and seasonal precipitation data for 1993 through 2002 are presented in Table 3-2.

Vandenberg AFB lies within the zone of mid-latitude prevailing westerlies from approximately November to April. During the rest of the year, the semi-permanent Eastern Pacific subtropical high-pressure cell creates a northwesterly to westerly flow direction. Locally, winds are usually light during the nighttime hours, reaching speeds of approximately 12 miles per hour by the afternoon. Winds at Vandenberg AFB most often are northwesterly in the northern portion of the base and north to northeasterly in the southern portion of the base. The strongest winds are associated with storms during the rainy season.

Early morning and afternoon temperature inversions occur over the base about 96 and 87 percent of the time, respectively. The inversion acts as a lid and restricts the vertical dispersion of pollutants, thus increasing local pollutant concentrations. Pollutants can be “trapped” in the inversion layer until heat lifts the layer or strong surface winds disperse the pollutants.

Table 3-1
Temperature Means and Extremes
(degrees Fahrenheit)

Data	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Average Year
1993													
Highest	73	71	73	73	75	79	72	71	83	81	81	72	**75**
Mean Max.	62	61	65	62	65	66	65	66	66	68	67	62	**65**
Mean Temp.	53	53	56	55	57	58	60	61	59	60	56	51	**57**
Mean Min.	45	45	48	48	49	51	55	56	53	51	46	41	**49**
Lowest	336	36	42	40	39	50	50	50	43	45	34	34	**41**
1994													
Highest	77	67	74	72	68	75	68	77	79	90	68	71	**74**
Mean Max.	62	59	62	60	61	62	62	66	67	67	60	59	**62**
Mean Temp.	52	50	54	53	54	55	57	59	59	57	49	49	**54**
Mean Min.	41	42	46	47	48	48	52	53	51	47	39	39	**46**
Lowest	34	31	41	39	42	47	47	48	45	36	31	28	**39**
1999													
Highest	75	68	64	79	68	64	81	70	84	93	81	77	**75**
Mean Max.	61	60	57	59	60	60	66	65	66	70	66	66	**63**
Mean Temp.	50	50	50	50	53	54	59	59	58	59	53	53	**54**
Mean Min.	40	40	42	42	46	49	52	52	50	47	50	50	**46**
Lowest	30	25	32	36	37	43	46	45	43	39	32	32	**37**

Table 3-1 (continued)
Temperature Means and Extremes
(degrees Fahrenheit)

Data	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Average Year
2000													
Highest	72	79	75	79	79	79	79	73	91	79	73	75	**78**
Mean Max.	61	62	62	64	63	65	68	67	71	65	63	65	**65**
Mean Temp.	53	54	53	55	55	58	61	60	62	59	52	54	**56**
Mean Min.	44	45	43	46	46	51	53	53	53	53	41	43	**48**
Lowest	32	36	34	39	36	41	46	48	46	45	34	36	**39**
2001													
Highest	79	84	72	72	75	75	77	72	84	84	77	77	**77**
Mean Max.	60	59	60	59	64	67	66	66	67	68	67	62	**64**
Mean Temp.	50	50	53	50	56	57	60	59	59	59	57	52	**55**
Mean Min.	40	41	46	42	49	48	53	52	51	50	48	42	**47**
Lowest	30	32	37	36	41	39	50	45	45	43	39	34	**39**
2002													
Highest	75	86	73	75	75	73	75	75	84	93	86	70	**78**
Mean Max.	60	68	64	64	62	65	69	66	71	68	73	64	**66**
Mean Temp.	50	54	53	54	54	57	60	59	61	57	60	54	**56**
Mean Min.	40	41	41	44	46	49	51	52	50	47	47	45	**46**
Lowest	30	30	34	36	36	41	45	43	45	39	39	36	**38**

Notes: Annual Average values are rounded to nearest whole number.
Source: Vandenberg AFB 2003.

Table 3-2
Monthly and Annual Precipitation
(in inches)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Season
1993	5.02	5.45	3.89	0.06	0.17	0.19	0.08	0.01	0.00	0.43	0.57	1.44	**17.31**
1994	2.13	2.91	2.51	0.72	0.73	0.03	0.07	0.02	0.07	0.67	2.02	1.80	**13.68**
1995	11.61	1.97	9.02	0.59	0.44	1.13	0.00	0.00	0.02	0.03	0.43	2.19	**27.43**
1999	1.93	2.29	9.00	2.01	0.00	0.03	0.15	0.02	0.00	0.05	0.18	0.12	**15.78**
2000	0.82	11.86	1.85	3.96	0.07	0.03	0.00	0.00	0.00	0.75	0.00	0.12	**19.46**
2001	4.10	5.50	3.13	0.86	0.00	0.00	0.02	0.00	0.00	0.64	2.60	1.14	**17.99**
2002	2.49	0.53	0.73	0.36	0.05	0.01	0	0.02	0	0.04	1.45	4.81	**10.49**

Source: Vandenberg AFB 2003.

The principal meteorological conditions that control dispersion are winds and turbulence (or mixing ability) of the atmosphere. The wind direction determines which locations would be affected by a given source. The wind speed, along with the degree of turbulence, controls the volume of air available for pollutant dilution. Atmospheric stability is a measure of the mixing ability of the atmosphere and, therefore, its ability to disperse pollutants. Greater turbulence and mixing are possible as the atmosphere becomes less stable, and thus pollutant dispersion increases. In general, stable conditions occur most frequently during the nighttime and early morning hours.

3.1.2 Existing Air Quality

The Clean Air Act (CAA), which was most recently amended in 1990, requires the United States Environmental Protection Agency (U.S. EPA) to establish upper limits for concentrations of certain criteria air pollutants. Based on the CAA requirements, U.S. EPA promulgated regulations that set the National Ambient Air Quality Standards, or NAAQS. California has also established its own air quality standards, known as the California Ambient Air Quality Standards, or CAAQS, which are set by the California Air Resources Board. The California standards are generally more stringent than the federal standards. Further, the CAAQS incorporate additional standards for sulfate, hydrogen sulfide, vinyl chloride, and visibility reducing particles. The NAAQS and CAAQS are shown in Table 3-3.

The U.S. EPA classifies air quality within each Air Quality Control Region with regard to its attainment of federal primary and secondary NAAQS. According to U.S. EPA guidelines, an area with air quality better than the NAAQS for a specific pollutant is designated as being in attainment for that pollutant. Any area not meeting the ambient air quality standards is classified as a nonattainment area. Where there is a lack of data for the U.S. EPA to make a determination regarding attainment or nonattainment, the area is designated as unclassified and is treated as an attainment area until proven otherwise. Pollutant concentrations within the Santa Barbara Air Basin are assessed relative to both the federal and state ambient air quality standards.

According to the Santa Barbara County Air Pollution Control District (SBCAPCD 2007a), the U.S. EPA officially revoked the federal 1-hour ozone standard on June 15, 2005. Santa Barbara County is designated as an attainment area for all federal standards and all state standards except as follows:

- California 8-hour ozone standard. A new California 8-hour ozone standard of 0.070 parts per million went into effect in May 2006, and while official designations have not been announced, the County is expected to be in nonattainment of this standard.

Table 3-3
National and California Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards Concentration[a,b]	National Standards[a]	
			Primary[b,d]	Secondary[b,e]
Ozone	1 Hour	0.09 ppm (180 µg/m^3)	---	Same as primary
	8 Hours	0.070 ppm (137 µg/m^3)	0.08 ppm (157 µg/m^3)	
PM_{10}	24 Hours	50 µg/m^3	150 µg/m^3	Same as primary
	Annual Arithmetic Mean	20 µg/m^3	---	
$PM_{2.5}$	24 Hours	---	35 µg/m^3	Same as primary
	Annual Arithmetic Mean	12 µg/m^3	15 µg/m^3	
Carbon monoxide	1 Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	None
	8 Hours	9.0 ppm 10 mg/m^3)	9 ppm (10 mg/m^3)	None
Nitrogen dioxide[f]	1 Hour	0.18 ppm (338 µg/m^3)	---	Same as primary
	Annual (arithmetic mean)	0.030 ppm 56 µg/m^3)	0.053 ppm (100 µg/m^3)	
Sulfur dioxide	1 Hour	0.25 ppm (655 µg/m^3)	---	---
	3 Hours	---	---	0.5 ppm (1,300 µg/m^3)
	24 Hours	0.04 ppm (105 µg/m^3)	0.14 ppm (365 µg/m^3)	---
	Annual (arithmetic mean)	---	0.03 ppm (80 µg/m^3)	---
Lead[g]	30-Day Average	1.5 µg/m^3	---	Same as primary
	Calendar Quarter	---	1.5 µg/m^3	
Visibility Reducing Particles	8 Hours	Extinction coefficient of 0.23 per kilometer – visibility of ten miles or more due to particles when relative humidity is less than 70 percent.	No Federal Standards	
Sulfates	24 Hours	25 µg/m^3		
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)		
Vinyl Chloride[g]	24 Hours	0.01 ppm (26 µg/m^3)		

Table 3-3 (continued)
National and California Ambient Air Quality Standards

Notes:
a California standards for ozone, carbon monoxide, sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter—PM_{10}, $PM_{2.5}$—and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
b Concentrations are expressed first in the units in which they were promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25 degrees Celsius and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25 degrees Celsius and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
c National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than 1. For $PM_{2.5}$, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard.
d National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
e National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
f The nitrogen dioxide ambient air quality standard was amended on February 22, 2007, to lower the 1-hour standard to 0.18 ppm and establish a new annual standard of 0.030 ppm. These changes become effective after regulatory changes are submitted and approved by the Office of Administrative Law, expected later this year.
g The Air Resources Board has identified lead and vinyl chloride as "toxic air contaminants" with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

EPA Environmental Protection Agency
$\mu g/m^3$ micrograms per cubic meter
mg/m^3 milligrams per cubic meter
$PM_{2.5}$ particulate matter equal to or less than 2.5 microns in diameter
PM_{10} particulate mater equal to or less than 10 microns in diameter
ppm parts per million

Source: California Air Resources Board 2007

- California 1-hour ozone standard.
- California annual arithmetic mean and 24-hour PM_{10} standards.

3.1.2.1 Ozone Nonattainment

Ozone is not produced directly by any pollutant source. Instead, it is formed by a reaction between nitrogen oxides (NO_x) and reactive organic compounds (ROCs) in the presence of sunlight. A reduction in ozone is dependent on a reduction in NO_x and ROC emissions. Significant reduction in NO_x and ROC emissions can be achieved through reducing the number of vehicle trips. Reduction of these pollutants has the added benefit of reducing the concentration of entrained PM_{10} and $PM_{2.5}$ emissions. (PM_{10} and $PM_{2.5}$ refer, respectively, to particulate matter that is 10 microns or less in diameter and particulate matter that is 2.5 microns or less in diameter.) Reduction of PM_{10} emissions is important because the County is currently in violation of the state standard for PM_{10}.

Ozone concentrations are generally highest during the summer months and coincide with atmospheric inversions. At their maximum, ozone concentrations tend to be regionally distributed. This is due to the homogeneous dispersion of the precursor emissions in the atmosphere. Hence, when an inversion occurs, the mixing of the precursor pollutants is within a much smaller volume of air. Air quality has been

improving over time in the County. In 2006, the County reported no days during which the NAAQS 8-hour standard was exceeded, 16 days during which the CAAQS 8-hour standard was exceeded, and one day during which the CAAQS 1-hour standard was exceeded at various monitoring stations throughout the County.

3.1.2.2 PM_{10} Nonattainment

Particulate matter 10 microns or less in diameter is produced either by direct emission of particulate matter from a source or by formation of aerosols as a result of chemical reactions in the atmosphere involving precursor pollutants. The sources of PM_{10} can also be categorized as natural (geogenic) or resulting from human activity (anthropogenic). The largest source of PM_{10} emissions in the County is entrained paved road dust. Other sources of PM_{10} emissions include dust from construction and demolition, agricultural activities, entrained road dust from unpaved roads, natural dust, and particulate matter released during combustion.

3.1.2.3 Baseline Air Quality

Federal clean air laws require areas with unhealthy levels of ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, and particulate matter to develop plans, known as State Implementation Plans (SIPs), stating how they will attain NAAQS. SIPs are a compilation of new and previously approved plans, programs, district rules, state regulations and federal controls. The currently approved SIP for Santa Barbara County is the 2001 Clean Air Plan. The 2001 Clean Air Plan is in effect for federal standards and was prepared to show how the County would maintain the federal 1-hour ozone standard through 2015. The U.S. EPA officially revoked the federal 1-hour ozone standard on June 15, 2005; therefore, in analyzing the potential air quality impacts from the proposed MFH Privatization project at Vandenberg AFB, emissions are compared to the Draft 2007 Clean Air Plan, which was prepared to address federal and state requirements. The Draft 2007 Clean Air Plan also documents the 2002 Annual Emissions Inventory for the County.

3.2 CULTURAL RESOURCES

Historical significance and cultural resource studies and findings in the West Housing area are summarized below. A more detailed cultural resources assessment is presented in Appendix B.

An archaeological site record and literature search was completed at 30 CES/CEVNC at Vandenberg AFB and at the Central Coast Information Center, University of California Santa Barbara. Background research included a review of archaeological literature, archaeological base maps, and cultural resource records. Previous archaeological studies within 1.0 mile of West Housing and archaeological resources within 0.25 mile of the project area (Tables 1 and 2, respectively, in Appendix B) were identified during the record search. For cultural resource studies, the area extending 60 meters from the existing housing complex was included in case the construction of access roads or emplacement of infrastructure—such as utilities—is necessary. More extensive information was collected for sites and isolated artifacts within the project area and the area extending 60 meters from it.

3.2.1 Historical Significance Studies

In the mid-1990s, the Tri-Services Cultural Resources Research Center at the United States Army Construction Engineering Research Laboratory (USACERL) completed a three-phase inventory and evaluation of Cold War properties on Vandenberg AFB to assist the installation in its effort to comply with Section 106 of the National Historic Preservation Act (McCullough and Nowlan 1997; Nowlan *et al.*

1996; Nowlan and McCullough 1997). The USACERL documents were consulted during the background research; an evaluation of family housing units is contained in Appendix A of the first USACERL volume. Military family houses on Vandenberg AFB were constructed after 1958 and thus do not meet the 50-year criteria for significance and, because the Cold War criteria for listing historic properties is focused on front-line weapons systems and support facilities, do not meet the criteria for early listing on the National Register of Historic Places (NRHP). In the housing privatization Section 106 consultation, the California State Historic Preservation Officer (SHPO) agreed that the Capehart houses on Vandenberg AFB are not eligible for inclusion on the NRHP. Since the USACERL evaluation, many of the Capehart houses have been demolished and replaced with more modern units.

3.2.2 Cultural Resource Studies Within and Adjacent to West Housing

Background research revealed that 34 cultural resource studies have been completed within 1 mile of the proposed MFH privatization project area (see Table 1 in Appendix B). Eight of those studies were within or adjacent to the project area and are summarized below. Five of these studies were done specifically for housing replacement projects. While a number of archaeological surveys have been completed within and adjacent to the Vandenberg AFB housing complexes, only five meet the current standards set forth in Volumes 5 and 6 of the base's draft Integrated Cultural Resources Management Plan (ICRMP). Among these is a recently completed survey of the cantonment area that encompassed the entire footprint of the proposed MFH privatization project.

Study 1. In the early 1980s, an archaeological survey of seismic corridors was completed for the Union Oil Company of California (WESTEC Services, Inc. 1981). Thirty seismic lines were examined, including two lines within the military family housing. No archaeological resources were found within or near the military family housing.

Study 2. A cable replacement project included an archaeological survey just north of the West Housing area (Greenwood and Foster 1984). A corridor 100 feet wide was examined. Two sites were discovered near the military family housing. Their precise locations are unclear, but in the base GIS, CA SBA-1868 is about 80 meters from the edge of the housing complex and thus is outside the 60-meter buffer for the proposed MFH privatization project, while CA-SBA-1869 is within the 60-meter buffer. About 20 artifacts were observed in a 50-meter diameter area at CA-SBA-1869, and a single shovel test pit excavated in the site yielded 10 artifacts. Based on this limited evidence, Greenwood and Foster (1984:44) indicated that the site lacked sufficient constituent density and diversity—as well as chronological indicators—and was not eligible for the NRHP.

Study 3. Gibson (1986a, b) monitored installation of the replacement cable surveyed by Greenwood and Foster (1984) and found that CA-SBA-1869 was larger than initially indicated, covering an area measuring approximately 120 by 80 meters. Contrary to the site's plotted location in the base GIS, Gibson indicated that CA-SBA-1869 is more than 120 meters from the MFH area and that CA-SBA-1868 is more than 220 meters away. Also contrary to Greenwood and Foster (1984), Gibson argued that CA-SBA-1869 could yield information important to understanding local and regional prehistory and therefore was eligible for the NRHP. The site was investigated further during a study for MFH (Price *et al*. 1996) and is discussed in greater detail below.

Study 4. In 1993, SAIC (1994) completed an archaeological survey of a proposed recreational trail as part of an improvement to the Capehart MFH. A single isolated artifact (a chert flake) was identified in a landscaped and clearly disturbed area. Due to the disturbed context, the isolated artifact was not considered significant. No other archaeological resources were discovered.

Study 5. Archaeological studies for replacement of existing military family housing began in the mid-1990s (Price *et al*. 1996). The initial work included archival research focused on a World War II prisoner of war (POW) camp and cemetery. An archaeological survey of 93 acres in small, non-contiguous blocks in and near both East and West Housing identified one previously recorded prehistoric site, four previously unknown prehistoric isolated artifacts, and one historical feature within the survey area. No artifacts or features associated with the World War II prisoner of war camp or cemetery were found during the survey, and archival research indicated that all remains in the cemetery were exhumed in 1947 and moved to San Bruno, California.

As part of their study, Price *et al*. (1996) completed subsurface testing at archaeological site CA-SBA-1869 and at three isolated artifact locations. CA-SBA-1869 was found to lie just north of a dirt road that is just north of West Housing. Sixteen shovel test pits and a single 1 by 1 meter unit yielded three bifaces, seven cores, one edge-modified piece, and 1,475 flakes. A burned bone was recovered from the surface. The site's integrity was found to be moderately impaired although intact deposits were identified. Regardless, the site was evaluated as ineligible for the NRHP because it did not contain sufficient data to address important research issues. In particular, the site lacked chronological data (Price *et al*. 1996:21).

Shovel test pits were excavated at three of the isolated artifact locations. Two of these were located in East Housing; the third, CA-SBA-ISO-610, was in West Housing. Four shovel test pits at CA-SBA-ISO-610 yielded artifacts, and the site was re-designated as CA-SBA-3741; it also was tested to assess significance (Lebow and Haslouer 2005). The location of a fourth isolated artifact identified by Price *et al*. (1996) as CA-SBA-ISO-609 was subsequently re-designated VAFB-ISO-170. It was a shell pendant fragment found on a lawn in West Housing and was considered out of context. However, subsequent work identified other cultural materials and the location was designated as site CA-SBA-3748 (Stevens *et al*. 2005).

Study 6. Lebow and Haslouer (2005) continued the housing investigations begun by Price *et al*. (1996) by testing CA-SBA-3741 (originally recorded as isolated artifact CA-SBA-ISO-610) to evaluate NRHP eligibility. That effort included excavation of 67 shovel test pits and eight 1 by 1 meter test units that, together, yielded 1,218 flakes, 4 biface fragments, 3 cores, 1 projectile point fragment, 6 unpatterned flake tools, 10 bones, 1 marine shell fragment, 1 fire-altered rock, 6 pieces of ochre, and 4 pieces of asphaltum. Radiocarbon analysis revealed that the site was occupied around A.D. 1400. Although the integrity of CA-SBA-3741 had clearly been affected by construction of the family housing and associated infrastructure, roughly 55 percent of the site area was considered intact. Because data from the site could be used to address questions important to understanding prehistory, Lebow and Haslouer (2005:9.2–9.3) opined that CA-SBA-3741 was eligible for the NRHP. Furthermore, they argued that replacement of military family housing within the site would adversely affect the site's significant qualities.

Study 7. Stevens *et al*. (2005) documented archaeological investigations associated with a proposed expansion of West Housing. That expansion has since been dropped from consideration. Although their investigation of the expansion area was outside the scope of the MFH privatization project, the Stevens *et al*. (2005) effort included work within West Housing (i.e., within the proposed project footprint). Specifically, they completed subsurface testing in the vicinity of the marine shell pendant fragment originally reported by Price *et al*. (1996) as isolated artifact CA-SBA-ISO-609 and subsequently designated VAFB-ISO-170. Initial testing found flakes near the isolated artifact, and the location was designated as site CA-SBA-3748. Subsequent testing to evaluate NRHP eligibility included excavation of 33 shovel test pits and two 1 by 1 meter units. Together, these units yielded only 16 flakes. Of those, 13 were found within fill that had been imported during construction of the family housing, and the context of the remaining three flakes was unclear. Because of the lack of integrity and the low artifact

density in intact deposits, Stevens *et al*. (2005:10.6) recommended that CA-SBA-3748 was not eligible for the NRHP.

Study 8. Most recent of the MFH archaeological studies was a survey of the entire cantonment area, including the portions of West Housing not previously inspected (Applied EarthWorks, Inc., in progress). No new archaeological resources were identified within West Housing, although a small cluster of marine shell, including abalone, chiton, and clam shells, was identified in an open area between Ash and Aspen Streets. Some of the abalone shell fragments had been water-rolled and the chiton and clam shells appeared to be relatively fresh. Clam shells are extremely rare in prehistoric archaeological assemblages on Vandenberg AFB. Shells from California mussel were conspicuously absent; they typically comprise more than 90 percent of prehistoric shellfish assemblages on the base. A single chunky piece of Monterey chert was found, but it was not directly associated with the marine shell and appeared more similar to road gravel than to a prehistoric artifact. Given the characteristics of these artifacts, the location appears to reflect a collection of shells deposited by an occupant(s) of military family housing. Consequently, the location was not recorded as an archaeological site.

3.2.3 Cultural Resources Within and Adjacent to West Housing

Background research revealed that 15 archaeological sites and six isolated artifacts are recorded within 0.25 mile of the proposed MFH privatization project area (see Tables 2 and 3 in Appendix B). Archaeological sites within this area or within 60 meters of it include CA-SBA-1869, -3559H, -3741, and -3752. Site CA-SBA-3741 is the area designated as Parcel B (see Figure 1-2). The only isolated artifact within the project area or the 60-meter buffer is VAFB-ISO-228. Each of these resources is listed in Table 3-4, along with its location relative to the West Housing area and its NRHP eligibility. Site CA-SBA-3741, the only resource that is NRHP-eligible, is described below.

Table 3-4
Cultural Resources Within and Adjacent to West Housing

Resource Designation	Within Project Area	Within 60-meter Buffer	NRHP Eligible
CA-SBA-1869	No	Yes	No
CA-SBA-3559H	Yes	Yes	No
CA-SBA-3741*	Yes	Yes	Yes
CA-SBA-3748	Yes	Yes	No
VAFB-ISO-228	Yes	Yes	No

Note: * This resource is located within Parcel B.

CA-SBA-3741 (Within Parcel B)

This site was initially recorded as an isolated chert flake and designated CA-SBA-ISO-610 during the survey for the MFH replacement project (Price *et al*. 1996). It was subsequently renumbered VAFB-ISO-171. Excavation of four shovel test pits in the vicinity of the isolated artifact yielded a total of 20 flakes, indicating that the isolated artifact observed on the surface actually represented an archaeological site. This realization prompted Price *et al*. (1996:25) to recommend that "additional studies will be necessary to establish the extent of this deposit and assess its NRHP eligibility."

Testing to define site boundaries and evaluate NRHP eligibility was completed in August and October of 2004 (Lebow and Haslouer 2005). This effort included 67 shovel test pits and four 1 by 1 meter excavation units (a total volume of 21.47 cubic meters), revealing that the site encompasses 12,900 square meters. It lies primarily within the existing West Housing complex but also extends slightly outside to the north-northeast.

Recovered cultural constituents include 1,218 flakes, 4 biface fragments, 3 cores, 1 projectile point fragment, 6 unpatterned flake tools, 10 vertebrate faunal remains, 1 marine shell fragment, 1 fire-altered rock, 6 pieces of ochre, and 4 pieces of asphaltum. Radiocarbon analysis indicates that the site was occupied around A.D. 1040, corresponding to the late Middle Period. All vertebrate faunal remains are from medium/large mammals. The biface fragments are unused production rejects; functional analysis of the flake tools indicates that five of the six were used for skinning/butchering animals. Lithic debitage (the sharp-edged waste material left over from making stone tools) corresponds with the tool assemblage and indicates that on-site knapping included core reduction to produce flake tools and early-stage biface reduction. The distribution of lithic artifacts is clearly patterned, with the highest flake density southwest of Korina Street but the highest tool density northeast of the street. All of the production rejects are northeast of Korina Street, while the tool assemblage southwest of the street is dominated by flake tools (Lebow and Haslouer 2005).

The site apparently functioned as a short-term residence for people focused on hunting medium/large mammals. Given the relative lack of resources on Burton Mesa and the proximity of the site to the resource-rich San Antonio Creek valley, it is likely that site occupants were concentrating on the valley rather than the mesa. Because data from the site can be used to increase the current understanding of local settlement systems, Lebow and Haslouer (2005) opined that CA-SBA-3741 is eligible for the NRHP. Furthermore, because the site is within an area where houses will be demolished and replaced, Lebow and Haslouer found that the site's significant qualities might be adversely affected by the housing replacement project.

3.3 GEOLOGY AND SOILS

3.3.1 Geology

Vandenberg AFB is located in the Santa Maria physiographic district of the Southern Coast Ranges geomorphic province of California. This is a wedge-shaped region bounded on the northeast by the San Raphael Mountains, on the west by the Pacific Ocean, and on the south by the Santa Ynez Mountains (Hunt 1993). Major physiographic features of the land within the Vandenberg AFB boundary include the Casmalia and Purisima Hills; San Antonio Terrace; Barka Slough and Lompoc Valley; Burton Mesa and Lompoc Terrace; the Santa Ynez Mountains; Sudden Flats; and beaches, rocky headlands, and points. The MFH area is located within the Burton Mesa.

The base is underlain predominantly by marine sedimentary rocks of Late Mesozoic age and Cenozoic age. The basal unit underlying the entire base is the Franciscan Assemblage of upper Jurassic age (Dibblee 1950). The Franciscan Assemblage consists of pervasively sheared marine sedimentary rock and metamorphosed igneous rock with numerous serpentine intrusions (Dibblee 1988b). Extensive folding and faulting throughout the Vandenberg AFB area has created four structural regions: the Santa Ynez range, the Lompoc lowland, the Los Alamos syncline, and the San Rafael Mountain uplift (Reynolds 1985).

Burton Mesa extends from the San Antonio Valley south to the Santa Ynez River Valley and includes the cantonment area as well as the MFH area. It consists of a peneplain (an area of nearly flat, featureless

land) about 400 feet (122 meters) in elevation and is locally dissected by canyons (Dibblee 1950). Recent sand dunes are located along the northern coastal section of the Burton Mesa, but do not extend as far inland as on the San Antonio Terrace. Irregular, hummocky topography covers the dune field area of Burton Mesa (Johnson 1983; Woodring and Bramlette 1950). Burton Mesa constitutes one of the broadest, most extensive marine-beveled Pleistocene surfaces in California (Johnson 1983) and its dune sheet is the largest exposure of mid-Pleistocene sands in the Santa Maria Basin (Hunt 1993).

On Burton Mesa, bedrock is mostly covered by the Pleistocene Orcutt Sand. The Orcutt Sand is an older, dissected, surficial (i.e., occurring on the surface) sediment described as a tan to rusty brown, friable to locally indurated (hard), wind-deposited sand with a locally pebbly base (Dibblee 1988b). Bedrock on Burton Mesa is mapped as the upper unit of the middle to late Miocene Monterey Shale and the late Miocene Sisquoc Formation (Dibblee 1988b, 1989a). The upper shale unit of the Monterey Shale is characterized as a white-weathering, thin-bedded, hard, platy, brittle, porcelaneous and siliceous shale with flinty black laminae (thin layers) (Dibblee 1989a). The units of the Sisquoc Formation are characterized as white to cream-white, punky, laminated diatomite and diatomaceous mudstone or shale and light gray, diatomaceous claystone and shale, with splintery to spheroidal fracture (Dibblee 1989b).

A geotechnical investigation was completed in support of the MFH Privatization Project by MNS Engineers, Inc. in 2005. The investigation involved the advancement of soil borings to depths of approximately 10.5 to 40.5 feet below ground surface (bgs) at 13 locations within the East and West Housing areas. It was determined that the local geology generally consists of Orcutt Formation (Orcutt Sand) overlying folded sedimentary rock of the Miocene-age Sisquoc Formation. Subsurface conditions encountered consisted of interbedded alluvial deposits. Orcutt Sand was encountered in each of the soil borings and consisted primarily of poorly graded sand with silt to silty sand with interbeds of sandy clay, clayey sand, and lean clay. Orcutt Sand was encountered to the total depths explored, which was 40.5 feet bgs. Groundwater was first encountered at depths of 10 to 23 feet bgs during drilling operations and was later recorded at 5 to 21 feet bgs.

3.3.2 Soils

The proposed action area is located within the Burton Mesa landform, which is a wide erosional platform covering approximately 50 square miles and rising approximately 300 feet above the San Antonio Creek floodplain to the north, and about 400 feet above the Santa Ynez River floodplain to the south. Soils occurring on Burton Mesa and in the proposed action area are primarily those of the Tangair-Narlon association. The Tangair-Narlon association is composed of nearly level to strongly sloping terrain, somewhat poorly drained to moderately well drained sands, and loamy sands. It is about 30 percent Tangair and 30 percent Narlon soils, with the remaining 40 percent consisting of other soil series. The Tangair series consists of poorly drained sandy soils that have formed on old terrace deposits. It has very low fertility, a low shrink-swell potential, and the erosion hazard is only slight to moderate. The Narlon series consists of moderately well-drained soils that have a loamy sand surface and clay subsoil. This series has very low fertility potential. The erosion hazard is generally slight to moderate for water erosion; however, Narlon sand and Narlon sandy loam have a moderate to high potential for wind erosion. The Narlon series has a low shrink-swell potential in loamy sands and a high shrink-swell potential in clay and sandy clay (U.S. Air Force 1987).

Soils in the West Housing area consist of nearly level to strongly sloping terrain, somewhat poorly to moderately well drained sands, and loamy sands on terraces. These soils have very slow to medium runoff. As detailed by the Natural Resources Conservation Service, *2001 Official Soil Series Descriptions*, Tangair soils are somewhat poorly drained, have very slow to slow runoff, and occur on nearly level to gently sloping terraces at elevations of 40 to 900 feet. Narlon soils are poorly drained,

have slow to medium runoff potential, and occur on partially dissected terraces of nearly level to moderate slopes at elevations of 20 to 800 feet.

3.3.3 Seismicity

One known active fault, the Pacifico Fault, crosses the southern tip of Vandenberg AFB at Jalama Beach County Park. At least eight other known active faults exist in Santa Barbara County including Big Pine, Graveyard-Turkey Trap, Mesa, More Ranch, Nacimiento, Santa Cruz Island, Santa Rosa Island, and Santa Ynez faults. Movement of any of these known active faults could affect the MFH area, as could activity along the regional San Andreas Fault system (U.S. Air Force 1987). Inactive faults including the offshore Hosgri and Lompoc faults, located in the Santa Barbara Channel, and local faults currently considered inactive, such as the Honda, Lion's Head, and Point Sal faults, also have the potential to affect the project area. No known active faults are located beneath the project location (Woodward-Clyde 1985). The West Housing area is not located within an Alquist-Priolo earthquake zone.

In Santa Barbara County, the recurrence interval for major earthquakes (magnitudes 5.2 to 7.0) is wide ranging, and may be from every 14 to every 115 years (U.S. Air Force 1987). Between 1932 and 1975, an average of three earthquakes per year was reported for the Vandenberg AFB area. Magnitudes for the earthquakes reported during this period ranged from 2.5 to 4.9. The California Division of Mines and Geology has estimated maximum earthquake intensities for the Vandenberg AFB area would range from VII to IX on the Modified Mercalli Intensity Scale. Earthquakes with intensities of VII to VIII cause moderate to considerable structural damage. Most masonry and frame structures are destroyed by earthquakes with an intensity of IX. Although Vandenberg AFB is located in an area subject to earthquakes, the base has not reported damage to its facilities from earthquakes (U.S. Air Force 1987).

3.3.4 Geologic Hazards

In addition to potential structural damage, tsunamis, surface fault ruptures, liquefaction, and landslides are also related to regional earthquake activity. According to County of Santa Barbara seismic safety element maps, the West Housing area is located in an area with a low probability of tsunami, liquefaction, compressible or collapsible soils, and slope instability/landslides (County of Santa Barbara 2007).

The MFH area is not likely to be inundated by tsunamis because it is approximately 5 miles from the coastline and ranges in elevation from approximately 400 feet above mean sea level in the northwest section to 550 feet above mean sea level in the southeast section. The potential for surface fault rupture on Vandenberg AFB is considered to be low (U.S. Air Force 1987). At present, there are no known areas on the base where liquefaction has occurred. Liquefaction may have occurred as a result of regional seismic activity; however, no areas of liquefaction have been mapped or identified to date. The areas on Vandenberg AFB where liquefaction would be most likely to occur, if it occurred at all, are those where there is a sandy to silty soil, the water table is within 50 feet of the surface, and earthquake loading exceeds 20 percent of gravity. Areas meeting these criteria are near San Antonio Creek and the Santa Ynez River; the potential for liquefaction within the MFH area is low.

Surface rupture is the visible fracturing of the earth's crust that occurs as a result of movement along a fault line deep within the earth. Rupture may occur suddenly when there is an earthquake or more slowly when there is fault creep (California Geological Survey 2007). There are no known fault lines beneath the West Housing area.

Although there are locations on Vandenberg AFB where landslides have occurred and where there are unstable slopes, these hazards are unlikely to occur in the MFH area. The topography of this area is fairly flat, with gentle slopes in areas where there is a change in elevation.

3.4 HAZARDOUS MATERIALS AND WASTE MANAGEMENT

Hazardous materials and wastes are those substances defined as hazardous by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 U.S.C. 9601–9675), the Toxic Substances Control Act (TSCA) (15 U.S.C. 2601-2671), the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act (RCRA) (42 U.S.C. 6901–6992), and Title 22 of the California Code of Regulations (CCR). In general, this includes substances that, because of their quantity, concentration, or physical, chemical, or infectious characteristics, may present substantial danger to public health and welfare or to the environment when released into the environment. Executive Order 12088, under the authority of the U.S. EPA, ensures that necessary actions are taken for the prevention, management, and abatement of environmental pollution from hazardous materials or hazardous waste caused by federal facility activities. Hazardous wastes that are of special concern in demolition projects at Vandenberg AFB are PCBs (which may be present in fluorescent light ballasts), asbestos, and LBP.

3.4.1 Hazardous Materials Management

Vandenberg AFB uses numerous hazardous materials to accomplish mission and mission support activities. These materials range greatly in hazard potential. For example, the base uses highly explosive/toxic propellants to launch rockets and their payloads into space. However, more common and less toxic materials such as house paint are also classified as hazardous.

Per Air Force regulations, Vandenberg AFB requires all organizations using hazardous materials on base to obtain their hazardous materials through the HAZMART, a base function that centrally manages the procurement of hazardous materials per AFI 32-7086, *Hazardous Materials Management,* and 30 SW Plan 32-7086, *Hazardous Materials Management Plan*. Specifically, the HAZMART approves the use of hazardous materials on Vandenberg AFB only after the composition of the commodity and how it is to be used are reviewed to ensure compliance with environmental, safety, and occupational health regulations and policies.

While the issue of hazardous materials on Vandenberg AFB is managed through the HAZMART using the EnTrack standardized Air Force HAZMAT tracking system, the inventory of hazardous materials on the installation is monitored via the Hazardous Materials Management Information System (HMMIS). The HMMIS includes a module for tracking Business Response Plans prepared per California Health and Safety Code, Division 20, Chapter 6.95, *Hazardous Materials Release Response Plans and Inventory.* In general, each facility on the installation is required to prepare a Business Response Plan submittal detailing the storage of hazardous materials; typically, the reporting thresholds are 55 gallons for liquids, 500 pounds for solids, and 200 cubic feet for compressed gases *or* the Threshold Planning Quantity (TPQ) per 40 CFR 355, Appendix A, whichever is lower. The Business Response Plan submittals satisfy the Tier I/Tier II reporting requirements posed by 40 CFR 370. Where appropriate, supporting contractors using hazardous materials are also required to prepare and submit a spill contingency plan as a condition of their contract and prior to starting work on the base.

The HMMIS also includes a storage tank inventory that details the capacity and contents of each tank on the installation, an asbestos module that tracks the location of known ACM in base facilities, and a lead-based paint module that similarly tracks the locations where LBP is present. In addition, the HMMIS

includes a PCB module, which contains results of all PCB analyses performed on the installation dating back to 1985.

Within the housing area, hazardous materials used by the residents and contracted maintenance typically include architectural coatings (paints and varnishes) and cleaning products.

3.4.2 Lead-Based Paint and Materials Containing Lead

Lead-, mercury-, and chromium-based paints were commonly used from the 1950s until recently. In particular, LBP was commonly used before 1978 in housing construction because of its durability. Typically, LBP was used in high-wear areas such as doors, window sills, and exterior parts of houses. During a survey for LBP that was conducted at the base, paint samples were collected from a sample of five residences for each type of floor plan in MFH. Although the results from house to house were inconsistent, the general conclusion that can be drawn from the survey is that LBP is most likely to be found in the older MFH units in the hardwood trim around the doorways and window frames, varnished floors, utility room and garage door exteriors, and exterior paint on eaves and overhangs.

In addition to LBP, lead may be present in ceramic tiles in housing units. Samples of ceramic wall tile from Capehart units in the East Housing area were tested and found to contain lead; Capehart units in the West Housing area may also have lead in the ceramic wall tiles.

3.4.3 Asbestos

The Capehart housing units in West Housing, which were constructed between 1959 and 1961, predate current legislation relating to the management and disposal of asbestos building materials. The U.S. EPA regulates any material containing more than 1 percent asbestos by weight as an ACM, which must be managed and handled per 40 CFR 61, Subpart M, *National Emission Standard for Asbestos*, and 40 CFR 763, *Asbestos*. Disturbance of regulated ACM without the use of proper engineering controls or personal protective equipment, and causing visible emissions, is a violation of the National Emissions Standards for Hazardous Pollutants. In particular, these regulations impose strict controls on so-called "friable asbestos," which comprises any material containing more than 1 percent asbestos that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

Vandenberg AFB has published 30 SW Plan 32-1052-A, *Asbestos Management Plan*, and 30 SW Plan 32-1052-B, *Asbestos Operating Plan,* which detail policies and procedures for managing ACM on the installation. These policies and procedures are required to protect the health of personnel and to comply with applicable federal, state, local, and DOD regulations.

During previous environmental surveys of the Capehart MFH, asbestos has been found "in the floor tile, heating duct insulation in the attic space, in the furnace flue joint wrap and collar through the roof, and in the cement asbestos board paneling on the front elevations of many of the homes" (Sverdrup Corporation 1992). It was difficult to summarize the data because a baseline asbestos survey was not available. During the visual site inspection, no friable, crushed, or pulverized materials were found.

In October 1999, Dames and Moore Group Company (Dames and Moore) conducted a limited asbestos survey of selected housing units in West Housing that were scheduled for demolition as part of the Phase 7 MFH Replacement Project. While the houses that were surveyed do not comprise those that would be demolished under the MFH Privatization Initiative on Vandenberg AFB, they are representative in terms of construction, style, and age of those that will be. Accordingly, the survey findings are deemed applicable to the context of this EA. This survey detected asbestos in various materials found in several

areas throughout the housing units: sheet vinyl flooring typically found in the kitchen and utility room areas; parquet floor mastic found in the living room, hallway, bedrooms, and entrance areas; drywall; duct paper used to insulate heating register outlets; exterior stucco; exterior window putty; and exterior wall panels.

Although no testing was accomplished on roofing materials, previous testing indicated that roofing penetration mastic around the pipes and vents contained ACM.

3.4.4 Pesticides

The Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. §136–136y) establishes regulations for the proper use, storage, and disposal of pesticides. Department of Defense Instruction 4150.7, *DOD Pest Management Program*, outlines the policies, responsibilities, and procedures for implementing pest management programs. AFI 32-1053, *Pest Management Program*, and AFI 48-102, *Medical Entomology Program*, outline guidance for operating and maintaining a compliant and effective pest management program. Vandenberg AFB has an Installation Pest Management Plan that outlines the specific criteria and operational procedures employed by the base to ensure compliance with Air Force directives and federal and California regulations.

Chlordane was generally used as a pesticide from around 1948 until 1983, when EPA banned its use for all applications except termite control. The use of chlordane was banned entirely in 1988. DOD imposed its own restrictions on chlordane use in 1980 to preclude application at housing units where below ground air ducts could allow the pesticide to enter the home through heating or air conditioning ducts. Records of chlordane application in the MFH area are not available, and base personnel could not recollect with certainty whether the pesticide had been used. However, the legal application of chlordane in military housing areas for termite control was common practice, and it is reasonable to assume this included Vandenberg AFB. There are no records of any spills or releases of chlordane in the West Housing area.

3.4.5 Underground Storage Tanks

Underground storage tanks are subject to regulation under RCRA, 42 U.S.C. 6901; 40 CFR Part 280, *Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (USTs)*; and 23 CCR, Division 3, Chapter 16, *Underground Tank Regulations*. It should be noted that California regulations pose significantly more substantive and stringent requirements relating to the management of UST systems, which encompass the storage tanks and associated piping, than federal regulations.

When the base was turned over to the Air Force for use as a development and testing center for missile and space technology in 1958, the area now occupied by West Housing was the location of barracks, dining halls, latrines, and a portion of a motor vehicle storage and maintenance area for the former Camp Cooke. These military barracks and vehicle maintenance sheds were replaced in 1958 with the Capehart MFH complex. At that time, many of the USTs associated with the vehicle maintenance facilities were reportedly abandoned in place by filling them with sand or debris because their removal was not required. This was verified by the discovery of numerous USTs during multiple phases of the MFH Replacement Project between 1995 and 2000. Based on historical data and the former location of Camp Cooke, there is reason to believe that additional USTs and associated soil contamination from leaking storage tanks exists in the proposed project area. Specifically, USTs and/or soil contamination may be present under portions of Juniper Street and in the housing area between Juniper Street and Ash Street/Ocean View Boulevard. Contaminated soil is known to be present under portions of Juniper Street that were included in Phase 3

of the MFH Replacement Project; this contamination was detected but could not be removed without taking out the roadway. These areas of the MFH are designated as areas of concern (AOCs).

3.4.6 IRP Sites and AOCs

Although there are several Installation Restoration Program (IRP) sites throughout the base that are currently undergoing monitoring and/or remediation, none of these sites are currently located within the Vandenberg AFB MFH property. There are, however, AOCs in a portion of West Housing as discussed in section 3.4.5 (Underground Storage Tanks). These areas were addressed during various phases of the replacement of MFH in the area. Several tanks and associated impacted soil have already been removed (Vandenberg AFB 1996).

Although there are no IRP sites within the housing area, there are three sites within 1 mile of West Housing: Site 2, Site 20, and Site 24. Site 2 (Old Base Service Station), is nearest to the West Housing area and is located in the main cantonment area of the base, north of the intersection of Wyoming and Summersil Avenues. The service station was used for dispensing leaded and unleaded gasoline from 1941 until 1981. All USTs, associated piping, pump islands, an AST, pavement, and an oil/water separator were removed between 1981 and 1998. In addition, 170 cubic yards of soil were excavated below the former location of the two easternmost pump islands (Tetra Tech, Inc. [Tetra Tech] 2006b).

Site 20 is located in the main cantonment area, on the west side of Utah Avenue. Site 20 comprises three areas: UST Area (Area 1), Landfill 1 (Area 2), and Drum Disposal Site 1 (DDS; Area 3). Area 1 is located in the northern portion of Site 20. Three 10,000-gallon, concrete USTs were removed from Area 1 in 1993. The USTs were used to store diesel fuel from 1942 until 1946 and gasoline from 1951 to 1953. The USTs were apparently not used after 1953. Contamination at Area 1 includes diesel; gasoline; benzene, toluene, ethylbenzene, and xylene (BTEX) compounds; 1,2-dichloroethane (DCA); and 1,2-dibromoethane (EDB) (Tetra Tech 2006c).

Site 20 Areas 2 and 3 are on the west side of Utah Avenue. Landfill 1 was used as the main landfill for the base between 1942 and 1957. The area covers approximately 10 acres. Waste disposed of at Landfill 1 included municipal trash, incinerator ash, slag, scrap metal, pesticides, waste petroleum oil, lubricants, and potentially unexploded ordnance. The DDS is located southwest of Landfill 1 in the fenced UXO disposal area. Drums of waste petroleum oil, lubricants, and solvents are reported to have been buried at the DDS (Tetra Tech 2006a).

Site 24, known as the Entomology Wash Rack, is also located in the main cantonment area, west of the railroad spur adjacent to Utah Avenue and south of Nebraska Avenue. It is southeast of the West Housing area. Past uses of the site include vehicle maintenance, fueling, and washing and a laundry facility. Contamination sources at Site 24 include pesticides in soil around the entomology wash rack; gasoline, diesel, and chlorinated solvents associated with vehicle maintenance and fueling activities; and chlorinated solvents associated with the laundry facility (Tetra Tech, Inc. 2006d).

3.4.7 Unexploded Ordnance

The Military Munitions Rule (MMR), which was developed by the U.S. EPA in consultation with DOD, was published in 1997 in the *Federal Register*, Volume 62, Number 29, *Military Munitions Rule: Hazardous Waste Identification and Management; Explosives Emergencies; Manifest Exemption for Transport of Hazardous Waste on Right-of-Ways on Contiguous Properties*. The MMR details the proper management of waste military munitions and identifies when munitions become a solid waste subject to RCRA. For purposes of this rule, the term military munitions encompasses ammunition products and

components used by U.S. Armed Services for national defense and security—the term does not include nuclear weapons, wholly inert items, and improvised explosive devices.

The MMR—as promulgated at 40 CFR 266.202(a)—states that for regulatory purposes UXO and munitions fragments recovered and collected for on-range treatment/destruction during range clearance activities do not constitute a solid waste and are therefore not subject to RCRA.

There are approximately 80,000 acres on Vandenberg AFB that contain unexploded shells used during World War II that could conceivably be detonated by construction activities, resulting in injuries to personnel and damage to equipment. Notably, unexploded land mines have been recovered in the area of the 30th Security Forces Squadron's obstacle course and the adjacent Off-Road Vehicle Area, which are northwest of West Housing.

Results of a geophysical investigation of West Housing, completed in July 2006, indicated there were 1,084 anomalies in that area. All of the anomalies were subsequently evaluated against photographs, sketches, and maps of the area. Based on the evaluation, 673 of these anomalies were identified as anthropogenic targets, meaning they were associated with known features such as buildings, utility lines, and other metal objects in the survey area. The remaining 411 anomalies were designated as "targets of interest" to be evaluated further during a follow-up intrusive evaluation (Metcalf & Eddy, Inc. 2007).

The intrusive investigation was completed in July 2007. During the investigation, the 411 targets of interest (primary targets) were excavated along with another 872 secondary targets that were detected in the areas around the primary targets. The field team was unable to re-locate one primary target, and it was presumed to have been an anomaly that was moved during the time between the two investigations. Over 99 percent of the targets were identified as scrap, consisting of building materials, tent stakes, wire, tools, and miscellaneous metal. The rest of the targets were found to be anthropogenic (power poles and water meters). Only one of the recovered items, a metal tie-down strap from a jeep-type vehicle, could be associated with military use of the area. No munitions and explosives of concern (MEC) were recovered, nor were any small arms, fragmentation, or other munitions debris (Metcalf & Eddy, Inc. 2007).

Further, records research conducted as part of the geophysical investigation included review of maps, drawings, and other historical records of the West Housing area. Among the materials reviewed, there were none that indicated the presence of a grenade court in West Housing. One U.S. Army map, dated 1953, showed a hand-drawn label identified as a grenade court; however, no other evidence could be located to confirm the existence of the grenade court.

Based on the results of the geophysical and intrusive investigations and the documentary and physical evidence gathered, there is an extremely low probability that the West Housing area contains MEC or material potentially presenting an explosive hazard. Therefore, West Housing presents an extremely low hazard risk to individuals in the housing area (Metcalf & Eddy, Inc. 2007). Vandenberg AFB will proceed with requesting a certificate of clearance, which will allow the property transfer to be concluded.

3.4.8 Hazardous Waste Management

Management of hazardous waste at Vandenberg AFB must comply with RCRA Subtitle C (40 CFR Parts 260–279) regulations administered by U.S. EPA, unless otherwise exempted through CERCLA actions. Hazardous wastes at Vandenberg AFB are also regulated by the California Environmental Protection Agency Department of Toxic Substances Control (DTSC) under the California Health and Safety Code, Sections 25100 through 67188. These regulations require that wastes be handled, stored, transported, disposed of, or recycled according to defined procedures. The 30 SW Plan 32-7043-A, *Hazardous Waste*

Management Plan (HWMP), details the procedures to be followed for hazardous waste disposal on Vandenberg AFB.

Generally, hazardous waste on Vandenberg AFB is managed within the 90-day accumulation time that is authorized for a Large Quantity Generator. Hazardous waste can be stored at a generator's pre-approved Collection Accumulation Point for no more than 45 days. On or before the 45th day of storage, the hazardous waste must be transported to the Vandenberg AFB Consolidated Collection Accumulation Point at Building 6830; from there it is shipped off-base for disposal.

No hazardous wastes are stored within the MFH area on Vandenberg AFB. Household hazardous waste generated by residents is brought to Building 11510 where the household hazardous material collection and exchange program is located.

3.5 LAND USE

3.5.1 Land Use

There are 12 categories of land use on Vandenberg AFB, as listed in Table 3-5. By far the largest category is Open Space, which accounts for 88,260 acres, or about 90 percent of the base. Within the cantonment area, about 60 percent of the land is Open Space. Land uses near the West Housing area include Administrative, Community (Commercial), Community (Service), Open Space, and Outdoor Recreation.

Table 3-5
Land Use Designations on Vandenberg AFB

Administrative	Industrial
Air Education and Training Command	Launch Operations
Agriculture/Grazing	Medical
Airfield	Open Space
Community (Commercial)	Outdoor Recreation
Community (Service)	Water
Housing	

Source: Vandenberg AFB 2005b.

3.5.2 Visual Resources

Regional visual resources at Vandenberg AFB include natural and man-made features. Naturally occurring visual elements on the base encompass 42 miles of coastline that includes rocky headlands, coastal bluffs, and sandy beaches. A large dune complex, rolling hills, erosional valleys, and a broad sweeping mesa are found on North Base while the Transverse Range is a major mountain feature on South Base. Between the Casmalia Hills at the northern extent of the base and the Transverse Range to the south are the broad and generally flat areas of San Antonio Terrace, Burton Mesa, and Lompoc Terrace on which the majority of Vandenberg AFB activities occur. Man-made elements can be found throughout the base: space and missile launch complexes are located near the coast, and radar facilities, telemetry stations, and supporting utilities are distributed widely. The airfield is located southwest of the West Housing area, roughly between the housing and the Pacific Ocean.

The surface topography within the 99,579 acres of the base is varied, with the highest topographic relief occurring in the southern parts of the installation. The generally moderate slopes of the Casmalia Hills rise to over 1,300 feet and, to the south, the much steeper canyon slopes of Tranquillion Mountain form a dramatic backdrop to the southern coastal flats.

Within the West Housing area, visual resources include landscaping, open common areas, and recreational areas. Utility poles and overhead lines are present in the areas where the Capehart housing units are located; utility lines are underground around the MILCON units. Landscaping in the form of lawns and foundation plantings around the houses is present throughout the West Housing area. Because of its age, landscaping around the Capehart units is, in some places, denser and more mature than elsewhere in West Housing. There are stands of large eucalyptus trees that were planted as perimeter screening around portions of the Capehart area.

3.5.3 Recreation

Outdoor recreation activities at Vandenberg AFB include camping, picnicking, hunting, fishing, horseback riding, birding, hiking, beach combing, whale watching, and off-road vehicle use. Managed facilities include base picnic grounds and campgrounds, the Marshallia Ranch Golf Course, the Saddle Club, the Rod and Gun Club, the ORV Area, the archery and paintball range, and the Boathouse picnic and fishing areas. Areas designated as special interest areas are set aside for preservation of archaeological, botanical, ecological, geological, historic, zoological, scenic, or other features. Barka Slough, the Boathouse, and the Wildlife Viewing Sanctuary are a few examples of these types of areas (SRS Technologies 2006).

A 600-acre site west of the West Housing has been set aside for ORV riding; within the ORV Area there are 45 miles of existing roads and trails. The eastern boundary of the ORV Area is adjacent to the western boundary of the housing area and is separated from it by two eucalyptus windbreaks, which screen the housing area from dust and noise. The ORV area is no longer in use (Mercier 2007).

Recreational areas currently within the West Housing area include tot-lots, playgrounds, a skateboard park, and relaxation areas.

3.6 NATURAL RESOURCES

Natural resources are defined as the terrestrial and aquatic ecosystems with the native and naturalized plants and animals that occur throughout these ecosystems. This includes plant populations and communities, wildlife populations and their relationship to habitat, threatened or endangered species, and aquatic, wetland, and riparian ecosystems. Plant and animal species that are candidates for listing, or are listed, as threatened or endangered by the U.S. Fish and Wildlife Service, and species having equivalent status at the California state level, are referred to as special-status species and are given special consideration by law for their preservation.

Vandenberg AFB is located in a transitional ecological region that lies at the northern and southern distributional limits of many species and contains diverse biological resources. The base provides habitat for many special-status species, including federal- and state-listed threatened and endangered species, as well as California species of special concern. This analysis of the proposed project's effects on biological resources is based on a literature search and a site visit. The methods used to characterize the existing biological resources are briefly described below, and the results are discussed in following sections.

For the purposes of evaluating the affected environment, the habitats within Parcel A and Parcel B were assessed during a site visit that included a general biological survey of these areas and the areas immediately adjacent to them. The detailed biological survey data described in the *Environmental Assessment for the Replacement of Military Family Housing (Phases 3–14)* (Halliburton NUS 1996) and the *Revised Draft Environmental Assessment for Expansion of Military Family Housing* (Vandenberg AFB 2005c) were reviewed and incorporated in this EA as noted. The California Department of Fish and Game (CDFG) Natural Diversity Data Base (CNDDB) was also used to determine the potential occurrence of special-status species and habitats within the West Housing area.

3.6.1 Vegetation

Vegetation within the West Housing area consists of planted areas that are associated with existing residences and small patches of non-native grassland habitat that contains mature trees. Mature coast live oak trees (*Quercus agrifolia*), Monterey pine trees (*Pinus radiate*), and eucalyptus trees (*Eucalyptus* sp.) are present. In areas with mature trees, a non-native grassland understory is present and in many areas this understory is regularly mowed. Residential lawns also contain mature trees.

Non-native plant species, including pampas grass and various ornamental species are also present within the West Housing area. Residential lawns in particular contain non-native trees (palm trees, etc.) and shrubs. Greenways and other common areas consist of lawns that are regularly mowed.

Naturally vegetated areas west of the West Housing area support Burton Mesa Chaparral, a regionally rare and declining plant community specifically associated with certain upland areas on Vandenberg AFB and the surrounding Lompoc Hills. Burton Mesa Chaparral is characterized by the woody shrubs shagbark Manzanita (*Arctostaphylos rudis*), Purisima manzanita (*A. purissima*), coast ceanothus (*Ceanothus ramulosus*), and Santa Barbara ceanothus (*C. impressus*). Coast live oak (*Quercus agrifolia*) and *Quercus parvula* (no common name), both multi-trunked oaks that ultimately can reach tree size but are typically tall shrubs or low trees in Burton Mesa Chaparral, are widely scattered throughout the shrub cover. Degraded Burton Mesa Chaparral also occupies undeveloped land immediately west of the West Housing area (Halliburton NUS 1996).

A potential wetland area is present in an area adjacent to the West Housing area. This habitat is located within the area enclosed by the intersection of Utah Avenue, Oregon Avenue, and Magnolia Street. During the site visit, water was observed within this area, as well as wetland vegetation. A drainage occurs adjacent to the West Housing area, to the northeast where riparian and wetland habitats occur.

3.6.2 Wildlife

Mature trees within the West Housing area provide potential habitat for nesting birds. Bird species that commonly occur in West Housing are listed in Table 3-6.

Table 3-6
Common Bird Species Occurring in West Housing

Scientific Name	Common Name	Scientific Name	Common Name
Cathartes aura	Turkey vulture	*Thryomanes bewickii*	Bewick's wren
Buteo lineatus	Red-shouldered hawk	*Troglodytes aedon*	House wren
Buteo jamaicensis	Red-tailed hawk	*Regulus calendula*	Ruby-crowned kinglet
Falco sparverius	American kestrel	*Polioptila caerulea*	Blue-gray gnatcatcher
Callipepla californica	California quail	*Sialia mexicana*	Western bluebird
Charadrius vociferus	Killdeer	*Catharus guttatus*	Hermit thrush
Calypte anna	Anna's hummingbird	*Turdus migratorius*	American robin
Selasphorus sasin	Allen's hummingbird	*Mimus polyglottos*	Northern mockingbird
Columba livia	Rock pigeon	*Toxostoma redivivum*	California thrasher
Zenaida macroura	Mourning dove	*Sturnus vulgaris*	European starling*
Otus kennicottii	Western screech owl	*Chamaea fasciata*	Wrentit
Bubo virginianus	Great horned owl	*Vermivora celata*	Orange-crowned warbler
Picoides nuttallii	Nuttall's woodpecker	*Dendroica coronata*	Yellow-rumped warbler
Picoides pubescens	Downy woodpecker	*Dendroica townsendi*	Townsend's warbler
Picoides villosus	Hairy woodpecker	*Geothlypis trichas*	Common yellowthroat
Colaptes auratus	Northern flicker	*Pipilo maculatus*	Spotted towhee
Empidonax difficilis	Pacific-slope flycatcher	*Pipilo crissalis*	California towhee
Sayornis nigricans	Black phoebe	*Chondestes grammacus*	Lark sparrow
Sayornis saya	Say's phoebe	*Zonotrichia leucophrys*	White-crowned sparrow
Tyrannus verticalis	Western kingbird	*Zonotrichia atricapilla*	Golden-crowned sparrow
Vireo huttoni	Hutton's vireo	*Junco hyemalis*	Dark-eyed junco
Vireo gilvus	Warbling vireo	*Melospiza melodia*	Song sparrow
Aphelocoma californica	Western scrub jay	*Agelaius phoeniceus*	Red-winged blackbird
Corvus brachyrhynchos	American crow	*Sturnella neglecta*	Western meadowlark
Petrochelidon pyrrhonota	Cliff swallow	*Euphagus cyanocephalus*	Brewer's blackbird
Hirundo rustica	Barn swallow	*Carpodacus mexicanus*	House finch
Poecile rufescens	Chestnut-backed chickadee	*Carduelis psaltria*	Lesser goldfinch
Baeolophus inornatus	Oak titmouse	*Carduelis tristis*	American goldfinch
Psaltriparus minimus	Bushtit	*Passer domesticus*	House sparrow

Common wildlife species that typically occur within the West housing area include Pacific treefrog (*Hyla regilla*), ensatina (*Ensatina eschscholtzii*), arboreal salamander (*Aneides lugubris*), western fence lizard (*Sceloporus occidentalis*), western skink (*Eumeces skiltonianus*), southern alligator lizard (*Elgaria multicarinata*), silvery legless lizard *(Anniella pulchra pulchra),* western rattlesnake (*Crotalus viridis*), brush rabbit (*Sylvilagus bachmani*), western gray squirrel (*Sciurus griseus*), Botta's pocket gopher (*Thomomys bottae*), kangaroo rat (*Dipodomys* sp.), California vole (*Microtus californicus*), large brown bat *(Eptesicus fuscus),* coyote (*Canis latrans*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), Virginia opossum *(Didelphis virginiana)*, and mule deer (*Odocoileus hemionus*).

3.6.3 Special-Status Biological Resources

Sensitive habitats designated by the CDFG are not present within the project footprint; however they are present in areas adjacent to the West Housing area. Potential wetlands habitat is present within the area bounded by Oregon Avenue, Utah Avenue, and Magnolia Street. In addition, a drainage that may contain additional wetland and riparian habitat is located to the northeast of the West Housing area.

Mature eucalyptus groves present within the West Housing area provide potential roosting habitat for the monarch butterfly (*Danaus plexippus)*, which is a sensitive species that is tracked by the CNDDB. Oak trees are also protected by the County of Santa Barbara and are therefore considered a special-status natural resource. No additional special-status plant or wildlife species were observed within the West Housing area during the site visit. However, the species listed in Table 3-7 could occur within the West Housing area.

Special-status plant species that could occur within the West Housing area are the Gaviota tarplant (*Deinandra increscens* ssp. *villosa*), a federal and state endangered species; and the Kellogg's horkelia (*Horkelia cuneata* ssp. *sericea*), a species on the California Native Plant Society's List 1B (which includes plants that are rare, threatened, or endangered in California and elsewhere). A Biological Opinion issued by the U.S. Fish and Wildlife Service examined the potential occurrence of the Gaviota tarplant and found that no populations of this species have occurred in the West Housing area (U.S. Fish and Wildlife Service 2006); a copy of the Biological Opinion is included in Appendix C. Given the highly developed nature of the West Housing area, the Gaviota tarplant and the Kellogg's horkelia are unlikely to occur within the project site.

Table 3-7
Special-Status Wildlife Species that Could Occur Within the Proposed Project Area

Scientific Name	Common Name	Status
Reptiles		
Phrynosoma coronatum frontale	California coast horned lizard	CSC
Anniella pulchra pulchra	Silvery legless lizard	CSC
Birds		
Circus cyaneus	Northern harrier	CSC
Accipiter striatus	Sharp-shinned hawk	CSC
Accipiter cooperii	Cooper's hawk	CSC
Buteo reglalis	Ferruginous hawk	CSC
Aquila chrysaetos	Golden eagle	FP, CSC
Haliaeetus leucocephalus	Bald eagle	FP, FT*, SE
*Falco peregrinus anatum***	American peregrine falcon	SE
Falco columbarius	Merlin	CSC
Athene cunicularia hypugea	Western burrowing owl	CSC
Picoides nuttallii	Nuttall's woodpecker	CSC
Lanius ludovicianus	Loggerhead shrike	CSC
Eremophila alpestris	Horned lark	CSC
Dendroica petechia	Yellow warbler	CSC
Mammals		
Taxidea taxus	American badger	CSC

Notes:
* The bald eagle is federally proposed for delisting.
** The American peregrine falcon was taken off the federal endangered species list (delisted) in 1999.
FE Federally Endangered
FT Federally Threatened
FP Federally Protected (Bald and Golden Eagle Protection Act of 1940)
SE State Endangered
ST State Threatened
CSC California Species of Concern

3.7 NOISE

3.7.1 Noise Characteristics

The characteristics of sound include amplitude, frequency, and duration. The decibel (dB) is a logarithmic unit used to measure the magnitude of variations in air pressure associated with sound waves, or loudness. A sound level of 0 dB is considered to be the threshold of human hearing. Because the scale is logarithmic, each 3-dB increase in sound level represents a doubling of sound energy, although this increase may not necessarily be perceived by humans as a doubling of loudness (County of Santa Barbara 1992).

Sound frequency is measured in Hertz (Hz), with one vibration per second being equal to 1 Hz. Human hearing generally can detect sound frequencies in the range from 20 Hz (a low rumble) to 20,000 Hz (a high-pitched whine). Frequencies above (ultrasound) or below (infrasound) this range are inaudible to humans. Loudness is mainly dependent on the level of sound pressure, but is also affected by frequency. When measuring sound to determine its effects on the human population, A-weighted sound levels (dBA) are used. The "weighting" adjusts the measurement of the noise to correspond with human response in terms of assessments of loudness and annoyance (County of Santa Barbara 1992). Examples of typical A-weighted sound levels are shown in Table 3-8.

Table 3-8
Relative Sound Levels

Sound	Noise Level (dBA)	Subjective Evaluation	Relative Loudness
Sonic boom	140	Painful	256 times as loud
Security alarm	130	Painful	128 times as loud
Jet take-off, 200 feet	120	Deafening	64 times as loud
Riveting machine	110	Deafening	32 times as loud
Power mower, 5 feet	100	Very loud	16 times as loud
Motorcycle, 50 feet	90	Very loud	8 times as loud
Inside sports car, 50 mph	80	Loud	4 times as loud
Vacuum cleaner	70	Loud	Twice as loud
Ordinary conversation, 3 feet	60	Moderate	Reference
Private business office	50	Moderate	1/2 as loud
Inside average residence	40	Quiet	1/4 as loud
Soft whisper, 5 feet	30	Quiet	1/8 as loud
Inside recording studio	20	Very quiet	1/16 as loud
Rustle of leaves	10	Very quiet	1/32 as loud
Threshold of hearing	0	Very quiet	1/64 as loud

Source: Based on County of Santa Barbara 1992.

Sound duration is a factor in determining annoyance and, when considered with magnitude and frequency, in determining health effects such as hearing loss. Since sound levels usually fluctuate over time, one way to quantify sound in the environment is to use units that account for these temporal variations.

Noise is usually defined as sound that is undesirable because it interferes with communication and hearing, is intense enough to damage hearing ability, or is otherwise annoying. Noise levels often change with time. Therefore, to compare noise levels over different time periods, several descriptors were developed to account for the time variances. These descriptors are used to assess and correlate the various effects of noise on humans, including land use compatibility, sleep and speech interference, annoyance, hearing loss, and startle effects.

- The long-term equivalent A-weighted sound level (Leq). This describes time-varying noise energy as a steady noise level.

- Day-night average noise level (DNL). The DNL, often referred to as Ldn, has been adopted by federal agencies as the standard for measuring noise. The DNL is an A-weighted, 24-hour average of hourly averages. Each hourly average represents the sound energy of all the disparate sounds that occurred during that hour. The hourly average would be a continuous, uniform sound whose total sound energy would be equal to the sum of the individual sound energies of all the real sounds occurring during that hour. Typically, different hours of the day would have different hourly averages. For this reason, and for standardization, the DNL is defined as the average of the 24 hourly averages of the day.

- Community noise equivalent level (CNEL) has been adopted by the State of California as the descriptor for measuring noise levels. The CNEL is similar to the DNL, except that it includes a 5 dB penalty for evening noise (7:00 p.m. to 10:00 p.m.) in addition to the 10 dB "penalty" for nighttime noise.

In 1972, Congress enacted the Noise Control Act, Public Law 92-574. Among the requirements under the Noise Control Act was a directive to the U.S. EPA to "…publish information on the levels of environmental noise, the attainment and maintenance of which in defined areas under various conditions as requisite to protect the public health and welfare with an adequate margin of safety." The U.S. EPA published EPA-550/9-47-004, *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, in 1974 (Levels Document) (U.S. EPA 1974).

In the Levels Document, the U.S. EPA reported that the best metrics to describe the effects of environmental noise in a simple, uniform, and appropriate way were:

- The Leq; and

- The DNL or Ldn (a variant of Leq that incorporates a 10-dB "penalty" for nighttime noise).

Another factor that describes how noise is characterized and analyzed is whether the noise source is continuous or impulsive. Continuous noise sources are from highways, construction sites, and cities with heavy traffic and large airports. Impulsive noise is generated on an interim basis; on military installations, impulsive noise is generally from munitions and ordnance explosions and from sonic booms.

Outdoor noise levels below an Ldn of 65 dBA are recommended for residential and educational land uses (Departments of the Air Force, Army, and Navy 1978). The Occupational Safety and Health Administration (OSHA) recommends noise levels below 90 dBA for an 8-hour continuous noise exposure and a 24-hour average noise level below 70 dBA for members of the general public. Higher noise levels are permitted for progressively shorter noise exposures; for example, noise levels as high as 115 dBA are permitted for only 15 minutes or less.

3.7.2 Regional Noise Setting

Existing noise levels on North Vandenberg AFB are generally quite low; higher noise levels occur near industrial facilities and transportation routes. The Ldn at Vandenberg AFB is usually at or below 65 dBA, which is the generally accepted limit for outdoor noise levels in residential areas (Departments of the Air Force, Army, and Navy 1978; County of Santa Barbara 1992; U.S. Department of Housing and Urban Development 1978). Modern residential building shells will typically yield interior noise levels that are approximately 20 dBA lower than exterior levels (with windows and doors closed).

Typical noise sources on the base include automobiles, trucks, construction equipment, operations equipment, and trains. Aircraft overflights and rocket launches are less frequent noise sources. Intermittent noise levels increase in the area during launch activities and low-level aircraft flyovers (24-hour noise level of 48 to 67 dBA). The present noise level has been considered acceptable in previous EAs (Halliburton 1996).

3.7.3 Site Noise Setting

Sources of noise on North Base, where the West Housing area is located, include various launch facilities, support facilities, oil production testing sites, the Southern Pacific railroad, and traffic along primary and secondary roads (Halliburton NUS 1996).

Family housing is generally placed in a location that is away from industrial land uses in order to reduce the amount of noise from industrial activities (U.S. Air Force 1998). The West Housing area is well outside of the 65dB noise contour for the airfield (Vandenberg AFB 2005).

Air Force Instruction 32-6002, *Family Housing Planning, Programming, Design, and Construction,* says "Family housing improvement and construction must provide minimum noise level reduction of 20 percent. MAJCOMs [Major Commands] must review the Air Installation Compatible Use Zone report for each project to ensure that adequate sound attenuation is incorporated into the design of family housing units." (U.S. Air Force 1997)

Noise-sensitive land uses include (County of Santa Barbara 1992)

- Residential, including single- and multi-family dwellings, mobile home parks, dormitories, and similar uses;
- Transient lodging, including hotels, motels, and similar uses;
- Hospitals, nursing homes, convalescent hospitals, and other facilities for long-term medical care; and
- Public or private educational facilities, libraries, churches, and places of public assembly.

Sensitive noise receptors near the West Housing area include the Crestview Elementary School, Youth Center, Child Development Center, chapel and Religious Education offices, and Education Services facilities (Base Training, Distance Learning, Allan Hancock College, Embry Riddle Aerouniversity, Chapman University, and Laverne University).

3.8 POLICE, FIRE, AND EMERGENCY SERVICES

Vandenberg AFB provides its own police, fire, and emergency services. The base also has mutual aid agreements with Santa Barbara County, Lompoc, Santa Maria, and the Los Padres National Forest, and an inter-service agreement with the U.S. Penitentiary and the Naval Construction Training Center for furnishing fire protection for Vandenberg AFB property (Vandenberg AFB 2005b).

The 30th Mission Support Group (30 MSG) provides security, law enforcement, disaster response, civil engineer, base services, mission support, morale services, contracting, and logistical support. Part of the 30 MSG, the 30th Security Forces Squadron (30 SFS) provides more than 400 people for around-the-clock security and law enforcement support for Vandenberg AFB. Its personnel provide government resource protection, pass and registration, security clearance, crime prevention, law enforcement, traffic

control, installation entry procedures, internal and perimeter security, base confinement facilities, military working dogs, and fish and wildlife protection services. They also monitor security requirements for prime contractors and their subordinates (Vandenberg AFB 2007).

Also part of 30 MSG is the 30th Civil Engineer Squadron (30 CEV), which includes the Base Fire Department. The fire department provides 24-hour fire protection for base structures and family housing units, plus fire hazard awareness and fire prevention programs. They operate six permanent fire stations and 30 assigned fire fighting apparatus. Base firefighters provide wildland fire suppression and have mutual assistance agreements with Santa Barbara County for support as needed. There are five fire stations located throughout Vandenberg AFB; Fire Station 2, the Fire Services Headquarters facility, is located in the cantonment area at Building 10660 and is the fire station nearest the West Housing area.

The 30th Medical Group (30 MDG) provides medical, dental, bioenvironmental, and public health services to personnel assigned to Vandenberg AFB and their families, and to retirees. Ambulance and emergency room services are provided off-base. For health care needs not directly available on base, the medical staff has developed a referral network of local civilian health care providers who supplement the Vandenberg AFB staff (Vandenberg AFB 2007).

3.9 SAFETY AND OCCUPATIONAL HEALTH

There are two health and safety issues within the West Housing area. The first is related to the residences themselves: primarily to the Capehart units. As discussed in section 3.4, these residences are likely to contain asbestos, lead-based paint, and fluorescent lighting fixtures with ballasts containing PCBs. Chlordane may be present in soils around the housing units. Mold has been reported in a number of the units, both old (Capehart) and new (MILCON replacement). Mechanical deficiencies in the Capehart units—identified at the time some of these units were being demolished and replaced with MILCON units—include corroded and leaking water and sewer pipes, unsafe wiring, out-of-date fixtures which have been identified as fire hazards, and lack of ground fault interruptors (Halliburton 1996). It is reasonable to assume these conditions exist in the Capehart units that remain.

The second health and safety issue relates to the activities that occurred on the property while it was still a part of Camp Cooke. Underground storage tanks were present in this area and were used to store heating oil for the buildings and fuel for the vehicles. While many USTs were removed during the housing replacement project, additional USTs may still be present. Associated soil contamination is also likely to be present.

In addition, as discussed in section 3.4, UXO may be present in the 17-acre area of West Housing referred to as the Grenade Court.

3.10 SOCIOECONOMIC FACTORS

As described in the CEQ regulations implementing NEPA (40 CFR 1508.14), potential economic impacts are addressed only to the extent that they are interrelated with the natural or physical effects, therefore, the following analysis is focused on the management of solid waste at Vandenberg AFB and the labor market. Any socioeconomic impacts associated with the proposed MFH privatization project would likely occur during the Initial Development Phase (the first 6 years of the lease), when demolition, construction, and renovation activities are underway. The socioeconomic study area consists of the Santa Barbara–Santa Maria–Lompoc Metropolitan Statistical Area, following the boundaries of Santa Barbara County.

3.10.1 Regional Setting

The influence of Vandenberg AFB on population and employment varies widely within Santa Barbara County. The base generally has a larger influence on the northern portion of the county (generally referred to as North County) than on the southern portion (generally referred to as South Coast), drawing commuters from the area north of Lompoc. Although Vandenberg AFB also draws commuters from the southern portion of San Luis Obispo County, they account for only a small percentage of the total San Luis Obispo County labor force. Therefore, the assessment of the base's socioeconomic role focuses on northern Santa Barbara County, particularly the Lompoc and Santa Maria valleys.

3.10.1.1 Construction Industry and Labor

While employment in some sectors is forecasted to decrease, employment in the construction sector is anticipated to increase between now and the year 2030 (Table 3-9). The projected increase in the number of construction jobs countywide from 2000 to 2030 is roughly 290 percent. In North County, where the majority of population growth is projected to occur over this time period, construction employment is anticipated to increase as well. The projected increase in construction jobs in Santa Maria from 2000 to 2030 is considerably higher (nearly 340 percent) than for the county as a whole (Table 3-10).

Table 3-9
Santa Barbara County Employment Trends

Sector	2000 (percent)	2010 (percent)	2020 (percent)	2030 (percent)
Agriculture	8.7	8.3	8.2	8.2
Construction	4.5	6.4	7.8	9.0
Finance, Insurance, Real Estate	4.2	3.9	3.6	3.4
Government	18.8	17.8	16.7	15.6
Manufacturing	10.2	10.6	10.7	10.8
Mining	0.5	0.5	0.5	0.4
Retail Trade	19.0	18.0	17.3	16.7
Services	28.2	28.8	29.4	29.8
Transportation	2.9	2.7	2.6	2.5
Wholesale Trade	3.2	3.3	3.4	3.5
Total Employment	178,000	205,000	231,000	257,000

Source: Santa Barbara County Association of Governments 2002.

3.10.1.2 Population and Housing

According to the 2000 census, the estimated population in Santa Barbara County in 2000 was 399,347 (U.S. Census Bureau 2000). Growth estimates for the county vary, depending on the factors used and the weight given to each one. Table 3-11 summarizes population projections for the county from various sources.

Table 3-10
Trends in Construction Employment, 2000–2030
(number of jobs)

Year	Lompoc Area	Santa Maria Area	Santa Barbara County Total
2000	800	1,920	8,000
2010	1,310	3,406	13,100
2020	1,810	4,887	18,100
2030	2,310	6,468	23,100

Source: Santa Barbara County Association of Governments 2002.

Table 3-11
Recent and Projected Population of Santa Barbara County

Agency	2000	2010	2020	2030
U.S. Census Bureau	399,347	-	-	-
California State Department of Finance	400,778	440,337	464,019	467,292
Santa Barbara County Association of Governments	399,347	461,900	504,400	521,000
Santa Barbara County Planning and Development	414,200	-	-	576,448

Sources: California State Department of Finance 2007; Santa Barbara County Association of Governments 2002; Santa Barbara County Planning and Development 2000; U.S. Census Bureau 2000.

The population within North County is forecast to increase by about 82,000 persons over the 2000–2030 time frame, an overall increase of 41 percent; in comparison, the population in the South Coast is projected to increase by 39,500 over the same period, an increase of only 20 percent. In North County, the Cities of Santa Maria and Buellton and the unincorporated areas of the Santa Maria Valley/Orcutt and Lompoc Valley are anticipated to have the largest proportional increases in population from 2000 to 2030. During this time, the rate at which the population increases in the county as a whole is expected to slow from 15 percent between 2000 and 2010, to 9 percent between 2010 and 2020, to 3 percent between 2020 and 2030 (Santa Barbara County Association of Governments [SBCAG] 2002).

Housing currently available in Santa Barbara County is adequate to meet local demands, although there is not a large surplus of housing units. According to U.S. Census figures, the housing vacancy rate in the county was 4.4 percent, which was lower than the overall California state average of 6.0 percent. The HRMA evaluated the rental housing in the vicinity of Vandenberg AFB, and determined the supply is expected to increase from 24,421 units in 2006 to 25,492 units in 2011, representing an annual growth rate of 0.9 percent. Rental market vacancies are estimated to remain at their current level of approximately 5 percent. About 61.5 percent of the currently available rental housing is projected to be suitable in 2011 (SAIC 2006).

3.10.2 Base Population and Housing

In 2000, there were 3,150 military personnel, 1,090 civilian employees, and 4,680 contractor employees at Vandenberg AFB (SBCAG 2002). According to the HRMA, "by the end of the transition period [2011], authorized manpower is expected to increase to 3,350, with 1,995 military families and 1,156 military bachelors requiring housing" (SAIC 2006).

3.11 SOLID WASTE

In 1989, the California Integrated Waste Management Act was enacted as Assembly Bill (AB) 939. AB 939 mandated a reduction in the quantity of solid waste disposed of in landfills, including a 50 percent reduction of generated solid waste from a 1990 baseline, by January 1, 2000. The Air Force mandated similar waste diversion goals in the Air Force Pollution Prevention Program, using a 1992 baseline. The Air Force Pollution Prevention Plan (AFPPP) required installations to achieve a 50 percent reduction of generated solid waste, excluding construction and demolition (C&D) debris by December 31, 1997.

Solid waste management programs in place at Vandenberg AFB include a sanitary landfill, refuse collection, recycling programs, and a household hazardous waste program. The recycling program also requires the management and processing of C&D debris.

3.11.1 Solid Waste Management

Under an agreement with the County of Santa Barbara, Vandenberg AFB is considered an unincorporated municipal wasteshed. This designation means the base is expected to manage all its own refuse and C&D debris.

Vandenberg AFB operates its own Category 1, Class III solid waste disposal site as defined in 27 CCR Section 20260 and is permitted to handle non-hazardous solid wastes only. Under Solid Waste Facilities Permit (SWFP) Number 42-AA-0012, issued by the California Integrated Waste Management Board (CIWMB), and Waste Discharge Requirement (WDR) Order No. R3-2004-0151, issued by the Regional Water Quality Control Board, the base landfill is permitted to accept up to 400 tons of waste per operating day. The County of Santa Barbara Environmental Health Services Department, as the Local Enforcement Agency, in conjunction with the CIWMB, regulates the operations and environmental compliance of the landfill. The RCRA Subtitle D footprint (the area occupied by landfilled trash, pursuant to 40 CFR 258) is 46 acres (Vandenberg AFB 2006). Solid waste management at Vandenberg AFB must also follow the requirements of AFI 32-7042, *Solid and Hazardous Waste Compliance* (U.S. Air Force 1994), which is currently undergoing revision. The updated Air Force Instruction will still allow contractors to dispose of solid waste at the base landfill, but they will be required to pay a tipping fee; currently the landfill does not charge a tipping fee.

The base landfill contains five areas for waste disposal (active landfill, nonfriable asbestos disposal area, animal cemetery, wood yard, and C&D staging area) and currently accepts residential, commercial, and industrial garbage, rubbish, and inert wastes (demolition materials such as dirt, rocks, and concrete). Concrete rubble is stockpiled at the landfill after being weighed in. Garbage is defined as wet waste collected primarily from residential areas and food establishments and rubbish as dry waste collected from the commercial areas. Special wastes, such as nonfriable asbestos and dead animals, are disposed of in separately designated areas. The facility accepts used tires (for recycling at an off-base location) and wood waste (pallets, tree stumps, and limbs for chipping and mulching at an off-base location) within the base landfill boundary.

The SWFP allows disposal of 400 tons per operating day of general, nonhazardous waste. The average daily quantity of solid waste received at the base landfill is between 40 and 60 tons. The base landfill is prohibited from accepting any designated liquid wastes, including grease, sewage sludge–septic tank pumping, burning waste, hot ashes, and untreated medical waste. Solid waste is collected from the MFH area by a contractor and taken to the base landfill for disposal. In addition, the Federal Correction Institute and United States Penitentiary, both located in Lompoc, use the base landfill for disposal of their

waste. Medical waste is not disposed of in the base landfill; it is collected by a contractor who autoclaves and disposes of it in an off-base landfill.

3.11.2 Solid Waste Reduction and Recycling

The State Board of Equalization (BOE) requires landfill owners/operators in California, including Vandenberg AFB, to provide a quarterly report indicating the amount of waste disposed of in and diverted from landfills. The BOE charges $1.35 per ton of waste disposed of. Waste reported as diverted from the landfill is subtracted from the amount accepted, and the credit for diversion results in a lower quarterly fee for waste disposal. In addition, waste diversion credits are used to calculate annual waste diversion to measure progress toward meeting mandated waste diversion goals. Vandenberg AFB submits a Solid Waste Disposal Report (SWDR) to the BOE quarterly. The SWDR states the quantity, reported in tons, of waste accepted at and diverted from the landfill. Accepted waste is categorized as garbage, rubbish, brush, kitchen waste, construction waste, asbestos, and other. Diverted waste is categorized as tires, wood, brush, concrete, asphalt, and recyclables. The SWDR also reports the waste sources and the number and type of vehicles entering the landfill.

Base-wide collection of refuse and recyclables is under contract at Vandenberg AFB and is managed by 30 CES/CEOEC, Service Contracts. The Refuse and Recycling Contract includes a prearranged collection route for refuse and recyclables pickup in the commercial and MFH areas. The refuse and recycling contractor provides all personnel, equipment, tools, materials, supervision, and other items and services necessary to collect recyclable materials and green waste as defined in the contract. Refuse collected by the contractor is disposed of in the base landfill.

Recyclables collected by the contractor cannot be taken to the landfill and are brought to an off-base recovery facility. The contractor is responsible for marketing the recyclable material that is collected and receives all proceeds from its sale. Material collected includes cardboard, glass, paper, tires, aluminum, plastic (1 to 7), scrap metal, plastic foam, bulk items, and segregated yard waste from the MFH.

3.11.3 Construction and Demolition Debris

There are different processes established for handling and disposing of C&D debris generated on Vandenberg AFB. Debris from construction is typically uncontaminated and is reused or recycled whenever feasible. The remainder of this material is taken to the base landfill for disposal. The debris from demolition is often contaminated with nails, rebar, or other construction material, which makes it more difficult to reuse or recycle. Concrete generated from demolition projects is taken to the landfill, where it is stockpiled for future reuse. Materials such as wood, metal, and glass are separated from the concrete prior to processing. These materials are either disposed of in the base landfill or recycled, as appropriate. Asphalt is also stockpiled at the landfill for future processing and reuse or removal for off-site recycling.

3.12 TRAFFIC AND TRANSPORTATION

3.12.1 Regional Setting

Vandenberg AFB is located approximately 5 miles west of the City of Lompoc. State Routes 1 and 246 provide access between the base and nearby metropolitan areas (see Figure 1-1). State Route 246, which runs east-west, links the base with Lompoc, Buellton, and Solvang, and with Santa Barbara via Highway 101. State Route 1 also links the base (southbound) with Lompoc and Santa Barbara and (northbound) with Orcutt, Santa Maria, and Guadalupe. Vehicles may enter the base from these two roads through

seven gates: Santa Maria, Lomoc, Utah, and El Rancho Gates via State Route 1 (Lompoc-Casmalia Road) and South Vandenberg, Solvang, and Coast Gates via State Route 246 (West Ocean Avenue). The most direct access to the West Housing area is through the Santa Maria (Main) gate.

Annual average daily traffic (AADT) is the total traffic volume on a segment of roadway for the year divided by 365 days. To determine the AADT on roadways in California, the California Department of Transportation (Caltrans) places electronic counting instruments in various locations on state roads. Traffic is not monitored continuously, but samples of traffic counts are collected. These counts are adjusted to account for seasonal fluctuations, weekly variation, and other variables and used to derive the AADT for a given segment of roadway.

Near Vandenberg AFB, State Route 1 experiences the most traffic between the City of Lompoc and the Santa Ynez River Bridge. In 2005, the AADT was 20,000 vehicles in the northbound direction and 28,000 vehicles in the southbound direction. Near the West Housing area, the AADT at the Main Gate is 16,100 westbound and 15,200 eastbound. On State Route 1, between the Main Gate and the junction with State Route 135, the AADT is 15,000 vehicles southbound and 16,200 vehicles northbound (Caltrans 2007).

3.12.2 Local Setting

Roads on Vandenberg AFB are categorized as primary, collector, and secondary (local) roads. Primary roads serve as circulation routes into and through the housing area. They carry the heaviest traffic volumes and serve as through traffic routes to collectors, which act as distribution routes to local streets. No parking is permitted on primary roads. In the West Housing area, California Boulevard and Utah Avenue are the principal primary roads. West Housing area residents must pass through the Santa Maria gate on California Boulevard or the Utah Gate on Utah Avenue to gain access to the housing area.

Collector streets move traffic through the neighborhood. Parking is permitted on one side of the roadway for roads with widths of at least 28 feet and on both sides of the roadway for widths of 34 feet or greater. The primary collector streets in the West Housing area include Juniper, Ocean View, Korina, and Magnolia Streets. Currently, some of the housing units front these streets.

Secondary (local) streets make up the majority of the road network in the housing area. These roads are the conduit for traffic movement between primary roads, collector streets, homes, and some community facilities. Traffic stops are frequent and speed limits are low. Most of the secondary roads in the West Housing area are through-streets connecting on each end to collector streets.

3.13 UTILITIES

The utility systems within the housing area are water, sewer, electricity, natural gas, storm drainage, and information transfer systems (telephone, computer network lines, cable television, and government telephone cable). Utility distribution systems serving the housing area also serve nearby non-housing support facilities that include Crestview Elementary School, Facilities 19510–19520, Child Care Center (Facility 16113), Youth Center (Facility 16170), Chapel (Facility 16200), and telephone/cable television providers located on Lake Canyon Road.

3.13.1 Potable Water

Before 1997, the water used on Vandenberg AFB was supplied by groundwater wells located on the base. When it became apparent that groundwater was being used faster than it could be replenished by natural

recharge, the base entered into a contract with the Central Coast Water Authority to purchase 5,500 acre-feet of water per year at an annual cost of $5 million (Vandenberg AFB 2005b). The current contract will terminate in 2035. The groundwater wells are now used only as a supplemental source of water to Vandenberg AFB.

The water distribution system at Vandenberg AFB serves the entire base and the Lompoc Federal Penitentiary. Average daily water use by the base and the prison is 3.6 million gallons.

Within the housing area, an estimated 90 percent of the water distribution system mains are asbestos-cement; the remainder are cast iron piping with cathodic protection. The water distribution system in the housing area, including water mains, manholes, hand holes, backflow prevention devices, service laterals, cathodic protection, fire hydrants, valves, meter boxes, and associated water distribution equipment, is owned, operated, and maintained by Vandenberg AFB.

3.13.2 Wastewater and Storm Water

3.13.2.1 Wastewater Treatment

Through an agreement with the City of Lompoc, wastewater from Vandenberg AFB is treated at the Lompoc Regional Wastewater Reclamation Plant. The base pays a sewage treatment fee to the City of Lompoc for this service. The Lompoc wastewater treatment facility has a capacity of 5,600 acre-feet per year (sbwater.org 2007), or 1,825.04 million gallons per year (one acre-foot equals 325,900 gallons), or approximately 5 million gallons per day (MGD). The treatment plant is currently experiencing no capacity limitations (City of Lompoc General Plan Housing Element 2003). The average sewage flow from Vandenberg AFB is approximately 1.32 MGD, comprising about 19 percent of the wastewater flow to the treatment plant.

Over the next few years, the Lompoc Regional Wastewater Reclamation Plant will be upgraded. The upgrade is needed in order to meet federal and state requirements to reduce concentrations of certain constituents in the treated wastewater discharged to San Miguelito Creek, which is a tributary of the Santa Ynez River (City of Lompoc 2006).

The sanitary sewer system for the housing area, including sewer lift stations, mains, manholes, and service laterals, is owned, operated, and maintained by Vandenberg AFB.

3.13.2.2 Storm Water Drainage

Storm water runoff on the base flows by gravity over the surface or through open drainage swales and underground structures. In the Cantonment Area, much of the surface water runoff flows toward San Antonio Creek; the remainder is channeled by an underground pipeline toward three detention lakes located in Pine Canyon (Vandenberg AFB 2005).

The storm drainage system in the housing area, including curbs, gutters, drain inlets, culverts, swales, and manholes, is currently owned, operated, and maintained by Vandenberg AFB.

3.13.3 Electricity

Electricity is supplied to the base by Pacific Gas & Electric Company (PG&E) under an area-wide Government Services Administration (GSA) contract. The current contract will terminate in March 2007. Two 70-kilovolt transmission lines deliver electricity from the Orcutt Substation to the switching station

(substation "A") on Corral Road at Vandenberg AFB. From there, power is distributed throughout the base. Electrical power consumption at the base was 182,497,304 kilowatt-hours during fiscal year 2003.

In some areas of West Housing, particularly the areas where the MILCON replacement units were constructed, power lines are contained in underground conduits. In the older neighborhoods, overhead power lines are still present, including the lines in "Power Alley."

The electrical service distribution system, identified as the A-7 primary electrical circuit and all related secondary laterals to the housing area; street lighting inside, near, and outside of the housing area boundary that is supplied by the A-7 primary circuit; and common area lighting inside the housing area boundary are currently owned, operated, and maintained by Vandenberg AFB.

3.13.4 Natural Gas

Vandenberg AFB receives natural gas under a GSA area-wide contract with Southern California Gas Company. The current contract will terminate in August 2007. During fiscal year 2003 the base used 440 million cubic feet of natural gas, at a cost of $1,779,537 (Vandenberg AFB 2005). The natural gas distribution systems to the housing area, including the gas mains, service laterals, cathodic protection, markers, regulators, meters for housing facilities, and related equipment, are currently owned by Vandenberg AFB.

3.13.5 Information Transfer Systems

3.13.5.1 Telephone

Telephone service in West Housing is provided by Verizon, which owns the overhead and underground telephone lines and associated equipment. There are currently no easements in place for the telephone lines. Overhead and underground telephone lines are owned by Verizon; the conduit for underground lines and the supporting equipment for overhead lines are owned by Vandenberg AFB.

3.13.5.2 Cable Television

Cable television service in West Housing is provided by Vandenberg Broadband, which also owns the overhead and underground cable lines and associated equipment. Vandenberg Broadband would continue to own these lines after the property is leased; they will not be conveyed to the PO. There are currently no easements in place for the television cable lines.

3.13.5.3 Computer Network and Secure Line Service

There are government-owned computer network lines within the housing area. When the property is leased, these lines will not be conveyed to the PO.

There are also government-owned telephone cable systems that provide secured-line service to the GOQ units. These lines will also not be conveyed to the PO when the property is leased.

3.14 WATER RESOURCES

In 1972, the Federal Water Pollution Control Act (also called the Clean Water Act) was amended to prohibit point source discharges of pollutants to waters of the United States unless those discharges are authorized by a National Pollutant Discharge Elimination System (NPDES) permit. At that time, the

NPDES permitting program focused primarily on discharge of industrial process wastewater and effluent from municipal wastewater treatment plants.

In order to expand NPDES permitting requirements to cover discharge of storm water, the Clean Water Act was amended again in 1987. Under this amendment, U.S. EPA was required to establish phased NPDES requirements for storm water discharges. The Storm Water Phase I Program (1990) established permit requirements for operators of medium and large municipal separate storm sewer systems (MS4s) located in unincorporated places or counties with populations of 100,000 or more and for various categories of construction activity, including construction activity disturbing five or more acres of land. According to 40 CFR 122.26(b)(8), "*municipal separate storm sewer* means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

> (i) Owned by or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law)…including special districts under State law such as a sewer district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the Clean Water Act that discharges into waters of the United States.
>
> (ii) Designed or used for collecting or conveying stormwater;
>
> (iii) Which is not a combined sewer; and
>
> (iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined in 40 CFR 122.2."

A Phase I MS4 was designated medium if the population served was between 100,000 and 249,999 or as large if the population served was 250,000 or greater.

The Phase II program extended NPDES permitting requirements to include all small MS4s located within an "urbanized area" and construction activity disturbing between 1 and 5 acres of land. The U.S. EPA published the Phase II Final Rule in the *Federal Register* on December 8, 1999 (U.S. EPA 2007).

A small MS4 is any MS4 that is not already covered by the Phase I storm water program. Small MS4s include federally owned systems, such as military bases (U.S. EPA 2000). Portions of Vandenberg AFB, including the West Housing area, are located within the Lompoc, California, urbanized area storm water entity as defined by the 2000 Census. An urbanized area, according to the Bureau of the Census, is "a land area comprising one or more places—central place(s)—and the adjacent densely settled area—urban fringe—that together have a residential population of at least 50,000 and an overall population density of at least 1,000 people per square mile" (U.S. EPA 1999). Vandenberg AFB is considered a "non-traditional" small MS4 and is therefore subject to the requirements of the Phase II Final Rule.

The U.S. EPA has authorized most states to implement NPDES storm water permitting at the state level. In California, this authority has been delegated to the State Water Resources Control Board (SWRCB) and its nine Regional Water Quality Control Boards. All storm water and wastewater management practices and activities on Vandenberg AFB are under the jurisdiction of the Central Coast Regional Water Quality Control Board (CCRWQCB). The guidance document for storm water management on the base is 30 SW Plan 32-7041-C, *Storm Water Management Plan* (Vandenberg AFB 2005a).

Construction programs in the state of California, including those on military installations, are required to comply with the requirements of the *NPDES General Permit, Waste Discharge Requirements (WDRs) for Discharges of Storm Water Runoff Associated with Construction Activity* (Order No. 99-08-DWQ, NPDES No. CAS000002), also referred to as the General Permit. The General Permit was issued by the SWRCB to regulate discharges from construction sites that disturb 5 acres or more; further changes to U.S. EPA and SWRCB regulations, which became effective March 10, 2003, amended the General Permit to include projects with soil disturbances of 1 acre or more (California Department of Transportation 2003).

In 2001, the General Permit was modified by SWRCB Resolution No. 2001-046 to require "that a sampling and analysis strategy and sampling schedule for certain discharges from construction activity be developed and kept with the project's SWPPP" (SWRCB 2004).

3.14.1 Surface Water

Vandenberg AFB encompasses portions of two major drainage basins, San Antonio Creek basin and Santa Ynez River basin. San Antonio Creek drains a watershed of approximately 154 square miles and flows westward to discharge into a lagoon impounded behind the coastal dunes on north Vandenberg AFB. The Santa Ynez River drains an area of approximately 900 square miles and flows westward to discharge into the Pacific Ocean. Aquifers capable of yielding large quantities of water are generally restricted to the deeper portions of the Santa Ynez River and San Antonio Creek.

The West Housing area is situated on high ground between these two drainage basins. The drainage in the north and west sections of the project area flows to the north and northwest through small, unnamed tributaries into San Antonio Creek. In the southern portion of West Housing, drainage flows to the south, into Lake Canyon which discharges to the Santa Ynez River.

3.14.2 Groundwater

Vandenberg AFB includes parts of two major groundwater basins and at least two subbasins. Most of the northern third of the base is within the San Antonio Creek Basin, while most of the southern two-thirds of the base is within the Santa Ynez River Basin and associated Lompoc Terrace and Cañada Honda subbasins.

The main groundwater basin on the northern portion of the base is the San Antonio Creek Basin. This basin coincides with the San Antonio Creek drainage basin. The San Antonio Creek Basin is approximately 25 miles long, extending from 4 miles east of the town of Los Alamos, west to the Pacific Ocean, and is a maximum of 1 mile wide. Water-bearing units in the San Antonio Creek Basin are composed of unconsolidated clay, silt, sand, and gravel of Pliocene to Recent age. These unconsolidated sediments are up to 4,000 feet thick and overlie consolidated Tertiary rocks, which are generally not water-bearing.

Across the eastern two-thirds of the San Antonio Creek Basin, largely east of Vandenberg AFB, groundwater flows toward San Antonio Creek and then west toward the Pacific Ocean. Approximately 2 miles west of the Vandenberg AFB boundary, a naturally occurring consolidated rock barrier causes the groundwater to rise to the surface where it forms the Barka Slough and discharges to San Antonio Creek. West of Barka Slough, across the San Antonio Terrace and Burton Mesa (where the West Housing area is located), the unconsolidated water-bearing units are only on the order of tens to a few hundred feet thick, composed of dune sands, Recent alluvium, and the Orcutt Sand. The groundwater flow direction in this area is controlled by bedrock topography, which is obscured by the overlying unconsolidated sediments,

but is believed to mimic surface topography. Groundwater flow direction is therefore likely to be toward San Antonio Creek.

3.14.3 Floodplains

There is a 100-year floodplain on Vandenberg AFB, located in low-lying areas bordering Shuman Creek, San Antonio Creek, Santa Ynez River, and Cañada Honda Creek. The failure of the Bradbury Dam at Lake Cachuma, approximately 34 linear miles east of the Vandenberg AFB boundary, would affect this area. West Housing is located approximately 5 miles north of the 100-year floodplain.

4.0 ENVIRONMENTAL CONSEQUENCES

This section presents the results of the analysis of potential environmental effects associated with the Proposed Action and alternatives. Changes to the natural and human environments that may result from the Proposed Action and alternatives were evaluated relative to the existing environmental conditions described in Chapter 3. Where applicable, the environmental effects of the Proposed Action and alternatives are discussed as short-term (meaning the period of time encompassed by the Initial Development Period) and long-term (meaning the time after the Initial Development Period ends).

4.1 AIR QUALITY

The release of various criteria pollutants would be expected from the demolition, renovation, and construction activities of the proposed project, contributing to the overall region emissions. The proposed project would have a significant impact on regional air quality if the amount of demolition-, renovation-, and construction-related (short-term) emissions exceeded air quality thresholds within the Santa Barbara Air Basin. The proposed project would not be expected to result in long-term impacts. Long-term impacts are environmental impacts resulting from the operational phase of a project, which, in this case, would be the years following the Initial Development Period. The proposed project would not result in an increase in operational emissions, since there would be a decrease in the number of housing units. The sections below summarize emissions resulting from the Proposed Action and alternatives.

4.1.1 Proposed Action

4.1.1.1 Short-Term Impacts

Short-term impacts would be related to construction, demolition, and renovation activities. Short-term emissions would be generated from sources such as worker commute, operation of construction equipment, grading, and application of architectural coatings. Construction activities of the Proposed Action would be completed during a 6-year period which is termed the Initial Development Period.

The Proposed Action would include demolishing a total of 501 units of two, three, and four bedroom configurations. An average area of approximately 1,455 square feet per unit is estimated from data provided in the Vandenberg AFB MFH Inventory; the actual total area to be demolished (501 housing units) is estimated at 728,767 square feet. Activities associated with the demolition would include tearing down existing structures and transporting the demolition debris to the base landfill. The demolition process is estimated to be completed in a 42-month period. Emissions resulting from the demolition phase were calculated using URBEMIS 2007, a software package approved by the SBCAPCD, and are summarized in Table 4-1. URBEMIS input and results for demolition are compiled in Tables A-6, A-7, and A-8 in Appendix A of this document.

The Proposed Action would also include the construction of 164 new, single family housing units. Activities associated with the construction of the new units would include site preparation, delivery of construction materials, and application of architectural coatings. The construction of the new units is estimated to be completed over a 33-month period overlapping some demolition of the Capehart units and renovation of MILCON units. Emissions resulting from the construction of the new units are summarized in Table 4-1. Emissions from construction activities were calculated using URBEMIS and are compiled in Tables A-12, A-13, and A-14 in Appendix A.

The Proposed Action also includes renovation of a total of 703 MILCON single family units of two, three, and four bedroom configurations. The renovation phase would be completed during a 56-month

period overlapping the construction of the 164 new housing units and some demolition activity. Activities associated with the renovation effort would include partial removal of walls, expansion of foundations, and construction of new walls. Emissions resulting from the renovation effort were calculated using URBEMIS and are summarized in Table 4-1. URBEMIS inputs and results are compiled in Tables A-9, A-10, and A-11 in Appendix A.

Table 4-1
Annual Emissions from Demolition, Construction, and Renovation Activities of the Proposed Action

Year	Activity	ROG (tons/yr)	NO_X (tons/yr)	CO (tons/yr)	SO_2 (tons/yr)	PM_{10} (tons/yr)
1	Demolition	0.25	1.37	0.99	0.00	0.40
2	Demolition and renovation	1.25	5.51	20.74	0.01	0.61
3	Demolition and renovation	2.37	5.06	19.41	0.01	0.60
4	Demolition, renovation and new construction	2.94	7.98	22.53	0.02	4.67
5	Renovation and new construction	3.82	5.21	20.93	0.02	0.23
6	Renovation and new construction	2.06	3.13	12.85	0.01	0.15

Notes: CO carbon monoxide
NO_x nitrogen oxides
PM_{10} particulate matter 10 microns or less in diameter
ROG reactive organic gases
SO_2 sulfur dioxide

4.1.1.2 Conformity Analysis

A formal air conformity analysis is required for the Proposed Action to ensure compliance with the implementation of the CAA and the SBCAPCD Rule 702, *General Conformity*. Section 176(c) of the 1990 CAA Amendments requires that all federal actions conform to the applicable State Implementation Plan. General conformity requirements are satisfied if the total direct and indirect emissions resulting from a federal action are less than the *de minimis* thresholds and are not regionally significant. The *de minimis* thresholds vary according to the type of pollutant and severity of federal nonattainment. A federal action is said to be regionally significant if its total direct and indirect emissions represent 10 percent or more of the total nonattainment or maintenance area's emissions inventory. Santa Barbara County is in attainment of all federal standards. Construction emissions resulting from the Proposed Action would not exceed the *de minimis* thresholds and would not be regionally significant.

Appendix A contains a detailed air conformity analysis that includes the regulatory summary and a detailed description of the estimation of criteria pollutant emissions associated directly and indirectly with the Proposed Action activities.

4.1.1.3 Long-Term Impacts

After the Initial Development Phase, the emissions in the housing area would be expected to return to their pre-project levels. Due to the reduced number of housing units, it is possible that emissions would be lower than pre-project levels. No long-term air quality impacts would be expected.

4.1.2 Alternative 1

4.1.2.1 Short-Term Impacts

Under Alternative 1, the number of housing units to be demolished would be approximately 2.5 times higher than the number of units to be demolished under the Proposed Action. While demolition activities under the Proposed Action are assumed to occur only during the first 4 years of the Initial Development Period, under Alternative 1, demolition would occur throughout all 6 years of this time frame.

Even under a worst-case scenario, where the number of housing units to be demolished and constructed during a single year was double the number under the Proposed Action, the emissions of criteria pollutants would still be less than the *de minimis* levels; they would also still be far below 10 percent of the regional emissions for all criteria pollutants. Therefore, no air quality impacts from Alternative 1 would be anticipated.

4.1.2.2 Long-Term Impacts

Long-term impacts under Alternative 1 would be the same as those described for the Proposed Action.

4.1.3 No-Action Alternative

Under the No-Action Alternative, there would be little change in air emissions from the current status. No air quality impacts would be expected.

4.1.4 Best Management Practices

All projects, regardless of size, that involve earthmoving activities are required to implement PM_{10} management measures which are based on policies adopted in the 1979 Air Quality Attainment Plan for Santa Barbara County (SBCAPCD 2007). The PO will implement the following measures, as necessary, to reduce fugitive dust emissions to a level of insignificance:

- During construction, use water trucks or sprinkler systems to keep all areas of vehicle movement damp enough to prevent dust from leaving the site. At a minimum, this will include wetting down areas in the late morning and after work is completed for the day. Watering frequency will be increased when wind speeds exceed 15 miles per hour. Whenever possible, reclaimed water will be used. Avoid using excessive amounts of water, which could cause runoff or erosion (see section 4.14).

- Minimize the amount of disturbed area at any given time.

- Reduce on-site vehicle speeds to a maximum of 15 miles per hour.

- Install gravel pads at all access points to prevent tracking of mud onto public roads.

- If fill material is to be imported, exported, or stockpiled for more than 2 days, it will be covered, kept moist, or treated with soil binders to prevent dust generation. Trucks transporting fill to and from the site will be kept tarped from the point of origin.

- After clearing, grading, earth moving, or excavation is completed, treat the disturbed area by watering, revegetating, or spreading soil binders until the area is paved or otherwise developed.

- The PO will designate a person or persons to monitor the dust control program and to order increased watering, as necessary, to prevent transport of dust off-site.

Additional management measures are required to reduce NO_x and $PM_{2.5}$ emissions from construction equipment (SBCAPCD 2007):

- Whenever feasible, utilize heavy-duty diesel-powered construction equipment manufactured after 1996.

- Utilize construction equipment having the minimum practical engine size.

- Minimize the number of pieces of construction equipment operating simultaneously.

- Maintain construction equipment in accordance with manufacturer's specifications.

- Utilize construction equipment equipped with two to four degree engine timing retard or pre-combustion chamber engines.

- Install catalytic converters on gasoline-powered equipment, if feasible.

- If available, install diesel catalytic converters, diesel oxidation catalysts, and diesel particulate filters as certified and/or verified by U.S. EPA or California.

- Replace diesel-powered equipment with electric equipment whenever feasible.

- Limit idling of heavy-duty diesel trucks during loading or unloading to 5 minutes; use auxiliary power units whenever feasible.

- Minimize worker trips by requiring carpooling and by providing for lunch on-site.

4.2 CULTURAL RESOURCES

Cultural resources would be adversely affected if the proposed project caused loss of the value or characteristics that qualify them for listing on the NRHP, or if the proposed project substantially altered the natural environment or access to it in such a way that traditional cultural or religious activities were restricted. Criteria used to evaluate the significance of cultural resources and to assess potential adverse project effects are set forth in the National Historic Preservation Act (NHPA) of 1966 (as amended). Associated implementing regulations include 36 CFR 60 and 800.

The following sections discuss the consequences of the proposed project on cultural resources within or near the MFH privatization project area. Table 4-2 summarizes the environmental consequences and

Table 4-2
Summary of Environmental Consequences for Cultural Resources

Resource Designation	Within Project Area	Within 60 meters	NRHP Eligible	Environmental Consequences	Management Measures
CA-SBA-1869	No	Yes	No	None	Privatization activities will be restricted to the area south of the dirt road that borders the northern edge of West Housing. An archaeologist and a Native American will monitor all ground-disturbing activities within 30 meters of the site.
CA-SBA-3559H	Yes	Yes	No	None	An archaeologist will monitor all ground disturbing activities within 60 meters of the site.
CA-SBA-3741	Yes	Yes	Yes	None	The site is within Parcel B. Demolition will proceed with restrictions; all buried utilities and Korina Street will be abandoned in place. Rubber-tired equipment will be used to break and remove concrete driveways, sidewalks, and slabs; imported soil will be used to fill depressions remaining after concrete removal. All demolition will be monitored by an archaeologist and a Native American. The lease for this parcel will terminate after 6 years; after that time, the property will be maintained by the Air Force as a green space with plantings of native trees and shrubs. Investigations for unexploded ordnance may be necessary within the site if magnetic anomalies outside the site indicate the area was used for grenade training during the Camp Cooke era. In this case, excavation would be expected to consist of small shallow holes primarily in imported fill. Excavation would be done under the guidance of a qualified archaeologist.
CA-SBA-3748	Yes	Yes	No	None	An archaeologist and a Native American will monitor all ground disturbing activities within 30 meters of the site.
VAFB-ISO-228	Yes	Yes	No	None	An archaeologist and a Native American will monitor all ground disturbing activities within 60 meters of the isolated artifact.

management measures. The following discussion of environmental consequences assumes that all privatization activities will be limited to the project area illustrated in Figure 1-2.

To comply with Section 106 of the NHPA and 36 CFR 800, the Cultural Resources Section (30 CES/CEVNC) at Vandenberg AFB has consulted with the California State Historic Preservation Officer (SHPO) and with the Tribal Elders' Council at the Santa Ynez Band of Chumash Indians regarding the MFH Privatization Project. Consultation with the SHPO was initiated in a letter dated July 13, 2006, describing the undertaking and requesting concurrence with a finding of no adverse effect. The letter was accompanied by the report *Archaeological Investigations Supporting Consultation with the State Historic Preservation Officer for the Privatization of Military Family Housing on Vandenberg Air Force Base, Santa Barbara County, California* (Lebow *et al*. 2006) detailing the archaeological studies completed for military family housing. In a letter dated August 2, 2006, the SHPO concurred with the determination of no adverse effect from privatization of military family housing. The Air Force reopened consultation with the SHPO in a letter dated December 18, 2006, after the privatization undertaking was modified, but the finding of no adverse effect remained. The SHPO again concurred, in a letter dated February 5, 2007.

Native American consultation included various meetings between the Air Force and the Tribal Elders' Council at the Santa Ynez Band of Chumash Indians. On July 26, 2004, staff from the 30 CES/CEVNC gave a presentation describing the proposed housing replacement and potential housing expansion. On August 4, and again on October 14, 2004, staff from the 30 CES/CEVNC met on-site with Tribal Elders to discuss the archaeological excavations in progress at CA-SBA-3741. The purpose of all of these meetings was to determine whether the Council of Tribal Elders had information or concerns about archaeological sites, ethnohistoric sites, or traditional cultural properties within the project areas. On 29 August 2005, staff from the 30 CES/CEVNC used another presentation to explain the proposed MFH privatization project and to discuss the Tribe's concerns regarding treatment of CA-SBA-3741. On October 26, 2005, the Air Force (including the staff from the 30 CES/CEVNC and representatives of the privatization effort) met on-site with Tribal Elders at CA-SBA-3741 to discuss the site and management options.

4.2.1 Proposed Action

Potential impacts from the Proposed Action are explained in terms of the impacts on the individual cultural resources sites described in section 3.2

4.2.1.1 CA-SBA-1869

This site is not within the footprint of the proposed project area but is within 60 meters of West Housing. Specifically, the site's southern boundary—which was defined by subsurface testing—lies about 40 meters north of the perimeter fence around the housing complex. Excavations revealed that the culture-bearing deposit between the site and the fence apparently was removed during construction of the existing housing. Price *et al*. (1996:21–22) opined that the site is not eligible for the NRHP but recommended that all ground-disturbing activities associated with housing replacement be restricted to the south side of the dirt road that parallels the northern edge of West Housing and that the north side of the road in the site area should be flagged as an exclusion zone. In addition, an archaeologist and a Native American will monitor all ground-disturbing activities within 30 meters of the site boundary, per Volume 5 of Vandenberg AFB's draft ICRMP. With these measures, the Proposed Action will have no environmental consequences for CA-SBA-1869.

4.2.1.2 CA-SBA-3559H

This site is the POW cemetery associated with Camp Cooke, although the burials were exhumed and reburied at the Golden Gate National Cemetery in 1947. Palmer (2000:186) indicates that the cemetery was bladed. In their July 13, 2006, consultation letter with the SHPO, the Air Force indicates that the site is not eligible for the NRHP. The SHPO concurred. Because the burials were removed and the site is not NRHP-eligible, the Proposed Action would have no environmental consequences for CA-SBA-3559H. An archaeologist will monitor all ground-disturbing activities within 60 meters of the site.

4.2.1.3 CA-SBA-3741 (Within Parcel B)

This prehistoric site is within and adjacent to a portion of West Housing. Lebow and Haslouer (2005) found significant, intact cultural deposits in the site, including the area within the existing housing development. The Air Force determined that the site is eligible for the NRHP in their July 13, 2006, consultation letter, and the SHPO concurred.

Subsequent to the NRHP eligibility determination, it was learned that CA-SBA-3741 was within an area designated as "Grenade Court," a grenade training area that may have been used during the Camp Cooke era. During their review of historical records for the area now within the West Housing boundary, Metcalf & Eddy, Inc. did not locate any evidence to indicate the Grenade Court's existence or use. Nonetheless, to investigate the possibility of UXO, a non-invasive geophysical survey of the West Housing area, including the potential Grenade Court area, was completed in 2006. This was followed in June–July 2007 by an intrusive investigation of targets of interest identified during the geophysical survey, including 149 targets within CA-SBA-3741 (Metcalf & Eddy, Inc. 2007).

During the intrusive investigation in CA-SBA-3741, materials recovered during excavation were monitored by an archaeologist who was also a UXO technician. Items of cultural importance were noted and segregated for inspection by a designated Chumash monitor (Santa Ynez Samala Band). This individual determined the final disposition of the materials at each site; afterward, the excavations were backfilled and any removed vegetation was replaced. None of the targets of interest were found to contain items related to ordnance (Metcalf & Eddy, Inc. 2007).

Because CA-SBA-3741 is eligible for the NRHP, it has been placed within a 4.7-acre Environmental Exemption Area, also referred to as Parcel B. Given that the intact, significant site deposits are capped with imported fill, demolition of the existing 18 houses within the exemption area can proceed without adversely affecting the site's significant qualities. All buried utilities and Korina Street will be abandoned in place. Only rubber-tired vehicles (such as backhoes) will be allowed on the site. Driveways, sidewalks, and the concrete slabs under each house will be broken into manageable pieces and lifted to avoid any impacts that might occur from digging these features. Imported soil will be used to fill depressions remaining after concrete removal. All demolition activities within the Environmental Exemption Area will be monitored by an archaeologist and a Native American.

The Environmental Exemption Area (Parcel B) will be included in the privatization lease for 6 years to allow demolition. After 6 years, the lease for Parcel B (including CA-SBA-3741) will be terminated, and the site area will be maintained by the Air Force as a green space with plantings of native trees and shrubs.

With the restrictions of the Environmental Exemption Area and the protocols for the UXO, the Air Force determined that MFH Privatization Project would not adversely affect CA-SBA-3741 and the SHPO

concurred. Consequently, there would be no environmental consequences to CA-SBA-3741 from the Proposed Action.

4.2.1.4 CA-SBA-3748

This prehistoric site is within and adjacent to the west edge of West Housing. Stevens *et al*. (2005) tested CA-SBA-3748 and found that it has poor integrity and little data potential, and opined that it is ineligible for the NRHP. In their July 13, 2006, consultation letter with the SHPO, the Air Force determined that the site was not eligible for the NRHP and the SHPO concurred. As a result, the Proposed Action would have no environmental consequences for the site. Per requirements in Volume 5 of the Vandenberg AFB draft ICRMP, an archaeologist and a Native American monitor will observe all ground-disturbing activities within 30 meters of the site.

4.2.1.5 VAFB-ISO-228

This isolated artifact lies just outside the southeastern edge of West Housing and thus is just outside the proposed project area but is within 60 meters of the boundary. The artifact was found in a disturbed context and consequently was considered insignificant by the recorders (SAIC 1994). An archaeologist and a Native American will monitor all ground-disturbing activities within 60 meters of the artifact's plotted location. With that measure, the Proposed Action would have no environmental consequences for this site.

4.2.2 Alternative 1

Ground-disturbing activities for Alternative 1 would occur within the same project footprint as described for the Proposed Action. Therefore, the same requirements for monitoring during ground-disturbing activities and the same requirements for demolition activities in the Environmental Exemption Area (Parcel B) would apply.

4.2.3 No-Action Alternative

Under the No-Action Alternative, Vandenberg AFB would retain ownership of the residences currently within West Housing and would continue to meet housing needs for military families. Those needs would include maintenance, replacement, and new construction. Any ground-disturbing activities from maintenance, replacement, or new construction that is in or near the cultural resources sites described here would have the same environmental consequences and management measures as discussed in section 4.2.1 for the Proposed Action.

4.2.4 Best Management Practices

Five cultural resources are within or near the MFH Privatization Project area: CA-SBA-1869, -3559H, -3741, -3748, and VAFB-ISO-228 (see Table 4-2). Archaeological monitoring will be necessary during any ground-disturbing activities within or near each of these resources. Native American monitoring will be necessary during any ground-disturbing activities at the same sites except CA-SBA-3559H.

The only significant (i.e., eligible for the NRHP) cultural resource within the proposed project footprint is CA-SBA-3741. This site is within an Environmental Exemption Area (Parcel B). Demolition of the 18 houses within the site will be allowed, with restrictions, and after 6 years the lease will expire and the site will be maintained as a green space by the Air Force.

The proposed project will comply with all relevant authorities governing cultural resources, including Section 106 of the NHPA and AFI 32-7065, *Cultural Resources Management Program*. In the event that previously undocumented cultural resources are discovered during construction activities, procedures established in 36 CFR 800.13 will be followed.

With these measures, the proposed project will have no environmental consequences for cultural resources. The No-Action Alternative will have no environmental consequences and will require the same management measures as the Proposed Action and Alternative 1.

4.3 GEOLOGY AND SOILS

Impacts would be considered potentially significant if the project resulted in substantially increased erosion, landslides, soil creep, mudslides, and unstable slopes. Impacts would also be considered significant if they increased the likelihood of, or resulted in exposure to, earthquake damage, slope failure, foundation instability, land subsidence, or other severe geologic hazards. Geologic impacts may also be considered significant if they result in the loss of the use of soil for agriculture or habitat, loss of aesthetic value from a unique landform, or loss of mineral resources.

4.3.1 Proposed Action

Adverse effects to subsurface geology and soils from construction, demolition, and renovation activities under the Proposed Action would be unlikely, since no major intrusive activities such as blasting or extensive excavation would be necessary. Removing building slabs, grading, road realignment, and underground placement of utility lines would occur, but these activities would be limited to relatively shallow depths. However, removal of USTs or contaminated soils may require extensive excavation. In the latter case, removal of contamination would improve soil conditions in the affected area.

There are no reported geologic resources such as economically recoverable minerals or unique geologic landforms within the West Housing area. Therefore, the Proposed Action would not impact public access to these resources. Additionally, the land use designation as Housing means there are no agricultural activities within this area, so the Proposed Action would not result in the loss of use of soil for agriculture. Similarly, there are no designated habitats in the West Housing area, and there would be no impacts to or loss of habitat.

Surface fault rupture during a seismic event is not expected to have a direct effect on residences in the housing area because there are no faults traversing the project site. However, seismic waves generated by earthquake events in the surrounding areas could potentially cause structural damage. The project's location in an area where seismic events can and do occur requires that residences and site amenities be constructed to meet Uniform Building Code requirements for seismic design.

Activities during the Initial Development Period would include some grading; however, because the topography of the area is relatively flat, there would not be any construction on slopes exceeding 20 percent grade or construction of cut slopes.

During the construction and demolition phases of the Proposed Action, there would be soil disturbance and removal of vegetation that would leave soils exposed. These activities tend to loosen the soil, and could promote erosion during periods of wind or rainfall. Since the project would be completed in phases, the extent of areas disturbed at any one time would be limited.

4.3.2 Alternative 1

Effects to geology and soils from Alternative 1 would be similar to those described for the Proposed Action, but the amount of soil disturbance could potentially be greater than under the Proposed Action because of the larger number of residences to be demolished and constructed. However, completion of the project in phases, the application of best management practices (BMPs) to reduce soil movement or loss, and adherence to requirements for managing storm water runoff would minimize any adverse effects.

4.3.3 No-Action Alternative

No soils and geology impacts would be associated with the No-Action Alternative.

4.3.4 Best Management Practices

To minimize soil erosion by wind or rainfall, appropriate sediment and soil control techniques will be used to avoid excess soil movement or loss. BMPs will be followed and will include the use of sediment basins, sediment fences, mulch, revegetation, and water spraying during dry periods. A Storm Water Pollution Prevention Plan will be developed by the PO and implemented in accordance with applicable state and Santa Barbara County guidelines to manage storm water runoff and erosion. The amount of soil exposed at any one time will be limited because the project will be completed in phases.

4.4 HAZARDOUS MATERIALS AND WASTE MANAGEMENT

An impact involving hazardous materials and hazardous waste would be considered significant if their transport, use, or disposal posed a serious hazard to the public or the environment. Appropriate considerations here include the potential for accidents resulting in the release of hazardous materials; emissions of hazardous materials associated with demolition and construction activities, especially within one-quarter mile of a school; activities that pose a serious risk of fire, especially wildland fires; potential obstruction of emergency response or evacuation routes within and around the project area; and violation of any associated federal, California, or Santa Barbara County regulation or applicable permit condition.

4.4.1 Proposed Action

The Proposed Action would involve the use of hazardous materials and the generation of hazardous waste during the construction, renovation, and demolition of housing units in West Housing.

4.4.1.1 Hazardous Materials

Hazardous materials used in conjunction with the Proposed Action would typically involve commonly used construction materials and fuel and lubricants for associated construction equipment. The use of significant quantities or concentrations of extremely hazardous substances would not be anticipated. The PO would be required to comply with all applicable federal, California, and Santa Barbara County rules and regulations pertaining to the storage and use of hazardous materials as well as applicable permit-to-operate conditions and/or any associated Authority to Construct. In particular, if on-site storage of any hazardous material exceeded reporting thresholds, the PO would be required to submit a Business Response Plan to the Vandenberg AFB Fire Protection Flight and to the Santa Barbara County Protective Services Division. This submittal would be required to conform to the California Health and Safety Code, Division 20, Chapter 6.95; 30 SW Plan 32-7086, *Hazardous Materials Management Plan;* and 30 SW Plan 32-4002-A, *Hazardous Materials Emergency Response Plan.* In addition, the PO would be

required to prepare a Spill Contingency Plan, to be reviewed and approved by affected Vandenberg AFB agencies prior to initiating any construction, renovation, and/or demolition activities.

If the capacity of containers 55 gallons or more in size that are used to store petroleum, oils, and lubricants within the project area exceeded 1,320 gallons in the aggregate, the PO would be required to prepare a Spill Prevention, Control and Countermeasures Plan in accordance with 40 CFR 112, *Oil Pollution Prevention.* This regulation requires that secondary containment be provided to preclude contamination of surface waters in the event of a release from the primary container.

The scope of the proposed construction and renovation activities would entail no action that would pose an unusual or extraordinary risk of a hazardous material release, fire, or emission that would threaten public health and safety. Subsequently, MFH residents would continue to purchase and use common household products containing hazardous materials, but such purchases and use would be consistent with those typical of other residential areas in the region.

4.4.1.2 Underground Storage Tanks

Historical data regarding the location and types of activities at Camp Cooke suggest there may be additional underground storage tanks and/or associated soil contamination in the proposed project area. In particular, this situation may exist under portions of Juniper Street and in the housing area between Juniper Street and Ash Street/Ocean View Boulevard. These areas are designated as AOCs.

Ground-disturbing activities associated with the Proposed Action have the potential to trigger tank removal and cleanup requirements, which would be the responsibility of the PO. End removal of any USTs would be completed in accordance with Title 23, California Code of Regulations, chapter 16, Article 7, "Underground Storage Tank Closure Requirements."

4.4.1.3 IRP Sites and AOCs

There are three IRP sites within 1 mile of the West Housing area: Site 2, Site 20, and Site 24; there are no IRP sites within the housing area itself. Because of their distance from the housing area, no impacts to the three identified IRP sites from the Proposed Action would be anticipated.

Areas within West Housing where USTs and/or soil contamination may be present are considered AOCs; potential impacts and environmental requirements are discussed in section 4.4.1.2, above.

4.4.1.4 Unexploded Ordnance

During June and July 2007, Metcalf & Eddy, Inc. conducted an intrusive investigation of 411 targets of interest (primary targets) identified during a geophysical investigation in 2006. Another 872 secondary targets were identified in the field during the 2007 investigation. All 1,283 locations were excavated and the sources of each geophysical anomaly were identified. Items recovered at more than 99 percent of the locations were determined to be miscellaneous metal scrap, including building materials, tent stakes, wire, tools, and metal. The remainder were found to be anthropogenic targets such as power poles and water meters. One primary target, identified during the 2006 investigation, could not be re-located during the 2007 investigation; the target was presumed to have been moved during the intervening time. No items were recovered that were related to UXO or munitions; only one item—a metal tie-down strap from a jeep-type vehicle—was recovered that could be associated with military activities (Metcalf & Eddy, Inc. 2007).

4.4.1.5 Hazardous Waste

The proposed renovation and demolition activities would be expected to generate hazardous waste and would involve the disposal of ACM, materials containing or coated with LBP, fluorescent light ballasts that may contain PCBs, and appliances containing ozone-depleting substances.

Asbestos-Containing Materials

The PO would be responsible for making inquiry regarding Air Force documentation of location, type, quantity, and characteristics of any ACM in the housing units before initiating any renovation or other work on the units that could disturb ACM. If the Air Force does not have adequate records to verify the presence or status of ACM, the PO would be responsible for filling the data gap through sampling (of bulk materials) and analysis (by a state certified laboratory). If any asbestos work became necessary, it would be done by the PO, who would be responsible for removal and disposal according to applicable laws. In this event, the PO would be required to have a disposal plan that identified the proposed disposal site.

Per the Dames and Moore recommendations, identified ACM should be removed prior to demolition by a California licensed asbestos abatement agency, and associated oversight and air monitoring should be performed by a qualified and certified consultant.

Lead-Based Paint/Coatings

A past survey of Capehart units on Vandenberg AFB indicated that LBP was likely to be found in the hardwood trim around the doorways and window frames, varnished floors, utility room and garage door exteriors, and exterior paint on eaves and overhangs. A more recent survey conducted in anticipation of demolition activities in East Housing indicated the presence of lead in ceramic wall tiles—it is reasonable to extrapolate this finding to the Capehart units in West Housing.

The Toxicity Characteristic Leaching Procedure (TCLP) is the procedure the U.S. EPA requires to determine if demolition debris containing lead-based paint or glaze is considered a hazardous waste. Typically, when the lead-containing coating (i.e., lead-based paint or glaze) remains affixed to a component substrate—such as window sills, doors, door frames, and ceramic tiles—there is a lower concentration of lead for the entire mass compared to paint/glaze that has been removed from the substrate. Accordingly, when the paint/glaze is left as part of the component waste (in this case, demolition debris), the chance of failing the TCLP threshold of 5.0 milligrams of lead per liter is significantly reduced.

The California DTSC applies a policy similar to that of the U.S. EPA regarding building components coated with lead-based paint or glaze. As noted in the *Military Base Closure Handbook—A Guide to Construction and Demolition Materials Recovery* published by the California Integrated Waste Management Board, "The Department [DTSC] does not generally expect intact painted building materials to exhibit a characteristic of a hazardous waste pursuant to the criteria contained in Chapter 11, Division 4.5, Title 22, California Code of Regulations (Title 22) and would not require the disposal of intact painted material as a hazardous waste. For example, when the paint is still bonded to the building materials, a generator should consider the ratio of the mass of all the materials in a waste to the lead content of the paint when determining the hazardous waste classification of the intact demolition debris. However, if during the demolition or dismantling of the buildings, the paint is separated from the building material (e.g., chemically or physically removed), then the paint waste should be evaluated independently from the building material to determine its proper management." The California hazardous waste

threshold for total lead is 1,000 parts per million (ppm), and the soluble threshold limit concentration (STLC) for lead is 5 ppm. If the total and soluble lead levels are below these threshold concentrations, the material is not considered a hazardous waste in California.

Accordingly, the PO would rigorously apply the required TCLP analysis to representative samples of demolition debris to determine whether such debris constitutes a hazardous waste; the results of this analysis would then dictate whether the demolition debris must be disposed of as a hazardous waste per applicable federal and California regulations.

PCB Fluorescent Light Ballasts

In fluorescent light ballasts, PCBs may be found within small capacitors or in the form of a black, tar-like potting material contained inside the fixture. Fluorescent light ballasts manufactured through 1979 contain PCBs; ballasts manufactured after 1979 that do not contain PCBs are labeled "No PCBs." If a ballast is not labeled "No PCBs," it will be presumed to contain PCBs at a concentration of 500 ppm or greater.

When fluorescent light ballasts containing 5 ppm or greater concentration of PCBs are taken out of service, 40 CFR 761 and/or 22 CCR, Division 4.5, Chapter 11, Article 3, Section 66261.24 require that they be properly disposed of as a PCB hazardous waste.

Since construction of the Capehart units in West Housing predates 1979, it is possible that PCB light ballasts may still be installed in these units. Accordingly, during the proposed demolition of these units, the PO will ensure that procedures are in place to check fluorescent light ballasts that are being removed to confirm whether they contain or may contain PCBs. Ballasts containing PCBs at concentrations at or above 5 ppm will be disposed of as a PCB hazardous waste. Ballasts that are labeled "No PCBs" will be segregated, handled, and managed separately from PCB light ballasts to avoid contamination by any leaking PCB ballasts. Per 30 SW Plan 32-7043-A, *Hazardous Waste Management Plan*, PCB ballasts may not be disposed of in the base landfill.

Ozone-depleting Substances

The proposed renovation and demolition effort in West Housing may involve the disposal of refrigerators that contain ozone-depleting substances used as refrigerants. In accordance with 40 CFR 82, *Protection of Stratospheric Ozone*, the release of Class I and/or Class II ozone-depleting substances (ODSs) into the environment pursuant to the maintenance, repair, or disposal of appliances is prohibited. Furthermore, technicians who maintain, service, repair, or dispose of such appliances must be certified per 40 CFR 82.161. In accordance with 30 SW Plan 32-7086, *Hazardous Materials Management Plan*, "under no circumstances will a contractor or private party dispose of or evacuate ODS-containing equipment on Vandenberg AFB in contravention of federal and/or California regulations relating to the management of ODS-containing substances." Accordingly, the PO would be required to ensure that an appropriately certified technician captured any regulated ODS from any refrigerator that could not be reused prior to its disposal.

Accidental Releases of Hazardous Materials/Waste

In the event of a spill or release of hazardous materials that could be competently handled by site personnel, the PO would take immediate action to contain and clean up the spill in accordance with the approved Spill Contingency Plan and any associated Business Response Plan and/or Spill Prevention, Control and Countermeasures Plan.

For a major release of hazardous materials/waste that could not be safely and competently contained, controlled, and cleaned up by site personnel, the PO would notify Vandenberg AFB emergency response elements per 30 SW Plan 10-2, *Emergency Management Plan,* and 30 SW Plan 32-4002-A, *Hazardous Materials Emergency Response Plan.*

The PO would be responsible for properly characterizing any waste generated as part of the cleanup process and disposing of the waste in accordance with applicable federal and California regulations. In addition, the PO would be responsible for restoring the release site to at least pre-existing conditions. Since the number of housing units at the end state would be less than the current number of units, the amount of hazardous waste generated by occupants may decrease compared to current conditions.

4.4.2 Alternative 1

Alternative 1 would involve more demolition and construction activity; accordingly, the quantities of hazardous materials used and the amounts of hazardous waste generated should be expected to increase with an attendant increase in the potential for an accidental release. However, because of the limited quantities of hazardous materials that are involved in such demolition activities, the requirements posed on the PO to properly manage the resulting hazardous materials/waste, and the indigenous capabilities of Vandenberg AFB emergency response elements, the potential for a significant release of hazardous materials or hazardous waste would remain very low for this alternative.

Since all of the Capehart units are scheduled to be demolished under this alternative, the potential for adverse impacts as they relate to the management of ACM, LBP-coated or lead-containing materials, ODS, and PCB wastes would be the same as described for the Proposed Action and is not considered significant.

4.4.3 No-Action Alternative

Under the No-Action Alternative, the proposed construction and demolition activities would not take place. Accordingly, there would be no potential for an adverse impact involving accidental releases or improper disposal of hazardous material/waste, ACM, LBP-coated or lead-containing materials, ODS, and PCB wastes incidental to any construction or demolition in West Housing.

4.4.4 Best Management Practices

The PO will be responsible for effecting cleanup of any hazardous materials/waste that may be released incidental to the Proposed Action or Alternative 1 and must restore any contaminated site to a condition at least as good as pre-existing conditions.

4.5 LAND USE

An impact to land use would be considered significant if it resulted in nonconformance with approved land use plans; conversion of prime agricultural land to other uses; a decrease in its productivity; or conflict with environmental plans or goals, Air Force regulations, permit requirements, or existing uses of the project area or other properties.

A visual resource impact would be considered significant if it interfered with the existing views, blocked visibility, or produced light and glare inconsistent with existing area uses.

4.5.1 Proposed Action

The Proposed Action is the continued use of the West Housing area for residential purposes. There would be no change in the land use or activities that would conflict with the current land use (Housing) as described in the base General Plan.

4.5.1.1 Short-Term Impacts

During the Initial Development Period, there would be some degradation of the visual setting in each area where demolition, renovation, and construction activities are taking place. As housing units and utilities are removed and replaced or modified, these areas would be in a state of disrepair. These impacts would be short-term, however. Since the Proposed Action is anticipated to occur in phases, the impacts would be localized and would not occur throughout the entire West Housing area for the duration of the Initial Development Period.

4.5.1.2 Long-Term Impacts

The long-term impacts on visual resources would be expected to be beneficial because the Proposed Action includes replacement of deteriorating housing units with units of more contemporary design. Additional improvements such as landscaping, removal and underground replacement of overhead utility lines, new street lighting, and new signs would enhance the aesthetic environment.

Recreation improvements would potentially include basketball and tennis courts, soccer and baseball fields, picnic areas, children's play equipment, bikeways, jogging trails, and common greenbelt areas. Since the Proposed Action would not disturb existing recreational land uses and would increase recreational resources within the West Housing area, the impact to recreational resources would be considered beneficial.

4.5.2 Alternative 1

Impacts to land use, visual resources, and recreational resources under Alternative 1 would be similar to those discussed for the Proposed Action.

4.5.3 No-Action Alternative

Under the No-Action Alternative, there would be no change in land use, and therefore no impact to land use. The visual setting, particularly in the neighborhoods with Capehart housing units would remain in a deteriorated condition and overhead utility lines would remain in place. There would be no improvements in housing design, utility line location, or recreational resources.

4.5.4 Best Management Practices

In the short-term, a phased approach to construction, demolition, and renovation activities will minimize the area affected at any given time. There would be no long-term adverse impacts to land use, visual resources, or recreational resources. Relocation of overhead utility lines underground will be a beneficial impact.

4.6 NATURAL RESOURCES

Federal agencies are required by Section 7 of the Endangered Species Act (ESA) to assess the effect of any project on federally-listed threatened and endangered species. Under Section 7, consultation with the U.S. Fish and Wildlife Service or National Marine Fisheries Service is required for federal projects if such actions could directly or indirectly affect listed species or destroy or adversely modify critical habitat; a conference is required if such action could directly or indirectly affect a proposed listed species or proposed critical habitat. It also is Air Force policy to follow management goals and objectives specified in Integrated Natural Resources Management Plans, and to consider special-status species, sensitive communities, and habitats recognized by state and local agencies when evaluating impacts of a project.

Impacts to biological resources would be considered significant if special-status species or their habitats, as designated by federal, state, or local agencies, were affected directly or indirectly by project-related activities. In addition, impacts to biological resources would be considered significant if substantial loss, reduction, degradation, disturbance, or fragmentation occurred in native species habitats or in their populations. These could be short- or long-term impacts; for example, short-term or temporary impacts may occur during project implementation, and long-term impacts may result from loss of vegetation and thereby loss of the capacity of habitats to support wildlife populations.

Other animal species that are not listed as special-status species are otherwise protected by federal laws, including the Migratory Bird Treaty Act (16 U.S.C. 703–711), and Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*. Under the Executive Order, federal agencies are required to evaluate the effects of their actions on migratory birds.

Introduction or spread of invasive plants (i.e., species that are non-indigenous or strains that become established in natural plant communities and wild areas, replacing native vegetation) can also result in impacts to sensitive habitats and natural ecosystems. Management of invasive plants on military installations is addressed in a number of regulations and policies, including the Federal Plant Pest Act (7 U.S.C. §150aa, *et seq*.); the Federal Noxious Weed Act of 1974, as amended (7 U.S.C. §2801, *et seq*.): AFI 32-7064, *Integrated Natural Resources Management*; and Executive Order 13112, *Invasive Species*. At Vandenberg AFB, preventing the establishment and managing the spread of invasive plants is addressed in the draft Integrated Natural Resources Management Plan.

4.6.1 Proposed Action

4.6.1.1 Short-Term Impacts

Given the lack of native vegetation in the project area, less than significant short-term impacts to vegetation would be generated by the Proposed Action.

Implementation of the Proposed Action would result in short-term, temporary impacts to common wildlife species and special-status wildlife species listed in Table 3-6. Individual wildlife species could be lost in the Proposed Action area due to excavation, crushing, or burial. Increased soil erosion in adjacent habitats may also result in a loss of individuals. Construction noise and disturbance may also result in the abandonment of breeding and/or roosting sites and the disruption of foraging or roosting activities. These impacts may occur both within the Proposed Action area and within adjacent habitats. These impacts would be localized, and due to the abundance of surrounding habitat, most wildlife species would likely move to suitable habitats that are out of the area of disturbance. Implementation of the management measures described below would reduce these impacts to a less than significant level.

4.6.1.2 Long-Term Impacts

Given the lack of native vegetation in the project area, less than significant long-term impacts to vegetation would be generated by the Proposed Action. Given the low likelihood of occurrence of the Gaviota tarplant and Kellogg's horkelia, less than significant long-term impacts to these special-status plant species would be generated by the Proposed Action.

Although there are no sensitive habitats within the project site, they do occur in areas adjacent to the site. Impacts to these habitats will be reduced to less than significant levels with implementation of the management measures described below.

Although the special-status wildlife species listed in Table 3-6 could occur within the West Housing area, given the highly developed nature of the project site, these species are likely to be transient visitors. Impacts to special-status species would be reduced to a less than significant level with implementation of the management measures described below.

4.6.2 Alternative 1

Since the Proposed Action requires the building of 164 new housing units, while Alternative 1 requires the building of 784 new housing units, short- and long-term impacts to natural resources generated by Alternative 1 would likely be higher than those generated by the Proposed Action.

4.6.3 No-Action Alternative

Under the No-Action Alternative, no impacts to natural resources would be generated.

4.6.4 Best Management Practices

The following management measures are required.

- A pre-construction survey by a qualified biologist should be conducted to ensure that special-status reptile and mammal species are not present within the project area prior to the start of ground-disturbing activities. If special-status reptile and mammal species are found during the survey, they should be moved to a location outside of the areas directly and indirectly (noise, etc.) affected by construction. Surveys and relocation activities must be conducted according to methods approved by the CDFG and conducted by a qualified biologist. If special-status reptile and mammal species are observed within the preconstruction survey, all construction activities will require the presence of a qualified biological monitor on the project site.

- A pre-construction nesting bird survey must be performed within 14 days prior to the start of any construction at the site. All mature trees within the site and trees immediately adjacent to the site must be surveyed. If an active nest is found construction cannot commence until the nest is inactive, or until the end of the nesting season (nesting season is between February 15 and September 1).

- A preconstruction survey of mature trees for use by monarch butterflies must be conducted by a qualified biologist prior to construction. If monarch butterflies are found using the mature trees as wintering sites, construction cannot commence until coordination with the CDFG has been conducted.

- If removal of mature Monterey pine trees is necessary, the number of trees removed will be replaced according to the County of Santa Barbara replacement policy. If removal of mature eucalyptus trees is necessary (provided the trees have been surveyed for monarch butterfly use in accordance with the previous management measure), they will be replaced at a 1:1 ratio with native trees. Replacement on-site will be conducted whenever feasible.

- Removal of mature trees within the project site shall be avoided whenever possible. If removal of oak trees is necessary, the number of trees removed will be replaced according to the County of Santa Barbara policy. Prior to removal of mature oak trees, an oak tree survey must be conducted by a qualified arborist in order to determine the appropriate replacement ratio. Replacement on-site will be conducted whenever feasible.

- BMPs, such as the use of silt fencing, must be used when working in areas adjacent to the potential wetland area bounded by Oregon Avenue, Utah Avenue, and Magnolia Street and the drainage located adjacent to the northeast of the project site. If construction is proposed within 100 feet of these areas, the CDFG, USACE, and CCRWQCB must be contacted to determine if a permit is required from these agencies.

- Information shall be distributed to future homeowners regarding the impacts of planting non-native species, and they will be provided with lists of native species that are suitable substitutes.

- One point-of-contact from the Engineering Planners will be responsible for notifying 30 CES/CEVPN of the construction schedule for each week.

4.7 NOISE

Noise impacts from a project would be considered significant if they generated noise levels in excess of 65 dBA CNEL that could affect sensitive receptors. At these locations, outdoor noise levels that exceed 65 dBA or indoor noise levels that cannot be reduced below 45 dBA would be considered a significant impact.

In addition, noise from grading and construction activity proposed within 1,600 feet of sensitive receptors, including schools, residential development, commercial lodging facilities, and hospitals or care facilities, would generally result in a potentially significant impact (County of Santa Barbara 1992).

4.7.1 Proposed Action

4.7.1.1 Short-Term Impacts

During the Initial Development Period, there would likely be noise impacts from the operation of heavy equipment used for construction and demolition activities. Table 4-3 lists typical noise levels of individual items of equipment. Construction and demolition activities would result in an increase in the ambient noise levels at nearby inhabited residences and at nearby schools. There would also be some increase in noise levels along roads as a result of hauling demolition debris away from the site, bringing in construction materials, and from workers commuting to the site.

Table 4-3
Typical Noise Levels of Heavy Construction Equipment

	Maximum Noise Level (dBA) at 50 feet	
Equipment Item	**FHWA 2006**	**BBN 1977**
Asphalt truck	-	81–84
Backhoe	80	78
Chain saw	85	-
Compactor (ground)	80	-
Concrete mixer truck	85	81–84
Dozer	85	84–86
Dump truck	84	84–87
Excavator	85	-
Flat bed truck	84	-
Front end loader	80	77–82
Grader	85	79–83
Paver	85	82
Pickup truck	55	-
Scraper	85	82
Trencher	-	72–77
Vacuum street sweeper	80	-
Water truck	-	81–84

Sources: Bolt, Beranek and Newman 1977; Federal Highway Administration 2006.

Noise from point sources, such as construction equipment, decreases by approximately 6 dB for every doubling of distance from the source. For example, at a distance of 50 feet, the noise level for a ground compactor would be 85 dBA; at a distance of 100 feet the noise level would decrease to 79 dBA. Additional reductions result from noise absorption by air and terrain; the reduction in noise levels from the values shown on Table 4-3, measured at a distance of 50 feet from the source, to the levels measured at 1,650 feet from the source would be about 30 dB. The maximum noise levels would be at locations closest to the actual construction/demolition site. These noise levels would not be continuous, since the equipment would be moving and would not be operated at maximum power for extended periods of time. In addition, noise from these activities would be temporary; at the conclusion of the Initial Development Period, noise levels within the West Housing area would return to their previous levels or lower, as there would be fewer residences than before.

Construction and demolition activities would occur during daylight hours only. Equipment noise would be controlled by the use of standard manufacturer-installed noise controls. To the extent practicable, high noise activities such as grading and demolition in the areas nearest the elementary school would be restricted to summer. Houses on the perimeter of each phase would be left standing as long as feasible to maintain a buffer and noise barrier for nearby noise sensitive areas. Noise level reductions up to 5 dB can be expected as a result of the barrier effect of the intervening row of houses. New homes would also have improved soundproofing that would reduce the levels of indoor noise (Halliburton NUS 1996).

Site workers would be required to comply with OSHA guidelines for hearing protection in order to minimize the effects of noise on them. The PO would be responsible for enforcing adherence to these guidelines by the construction contractor.

4.7.1.2 Long-Term Impacts

Once construction, demolition, and renovation activities are completed, noise levels would be expected to return to their previous levels. Anticipated noise would be that typically associated with residential areas.

4.7.2 Alternative 1

Noise generated by construction and demolition activities under Alternative 1 could potentially be greater than under the Proposed Action, due to the larger number of homes to be demolished and built. In addition, the increased amounts of demolition debris would necessitate more truck trips to haul away the material; similarly, the increased number of homes to be constructed would mean an increase in the number of truck trips needed to bring construction materials to the site.

After the Initial Development Period, noise levels in the West Housing area would be the same as described under the Proposed Action.

4.7.3 No-Action Alternative

There would be no additional noise impacts associated with the No-Action Alternative.

4.7.4 Best Management Practices

No management measures are required.

4.8 POLICE, FIRE, AND EMERGENCY SERVICES

Impacts to police, fire, and emergency services would be considered significant if they resulted in unacceptable service ratios, response times, or other performance objectives.

4.8.1 Proposed Action

Under the Proposed Action, the West Housing area would remain in its current location; therefore, in the long-term, response times for police, fire, and emergency services would remain unchanged. In the short-term, there is some potential that response times could be delayed by the presence of construction or demolition equipment and by roadway construction, although these impacts are not likely to be significant.

Vandenberg AFB would continue to provide fire protection, law enforcement services, and emergency services to the West Housing area. The level of service would also include emergency response, force protection and preventive maintenance support (U.S. Department of the Air Force 2007). Since the number of housing units would decrease from the current 1,336 residences to 999 residences, this reduction could provide a beneficial impact by reducing the service ratios for police, fire, and emergency services.

4.8.2 Alternative 1

Impacts to police, fire, and emergency services under Alternative 1 would be similar to those described for the Proposed Action.

4.8.3 No-Action Alternative

Under the No-Action Alternative, there would be no change in the number of housing units or their configuration. Service ratios and response times would remain essentially the same.

4.8.4 Best Management Practices

During the Initial Development Phase, construction and demolition equipment will be kept in areas where there will be minimal interference with response by police, fire, and emergency services. Roadway replacement and construction will be staged so that access to occupied residences remains unimpeded.

4.9 SAFETY AND OCCUPATIONAL HEALTH

An impact would be considered significant if it created a potential public health hazard or involved the improper use, production, or disposal of materials that pose a hazard to people, animals, or plant populations in the affected area.

4.9.1 Proposed Action

4.9.1.1 Short-Term Impacts

During the Initial Development Period, residents in adjacent areas and workers on-site could potentially be exposed to lead-based paint, asbestos, fluorescent light ballasts containing PCBs, chlordane in soils, construction activity involving heavy equipment and additional vehicular traffic, and to the potential for accidental exposure to hazardous substances released from inactive USTs.

Fencing would be placed around all units undergoing demolition and construction in order to protect public and worker safety and to prevent unauthorized access to the site. The locations of any USTs encountered during site work would be identified to prevent accidental releases of any materials remaining in the tanks. Asbestos and lead-based paint would be removed by qualified personnel and handled and disposed of according to all applicable regulations.

The site workers would comply with OSHA, U.S. Air Force Occupational Safety and Health regulations, the COE Safety and Health Requirements Manual (EM 385-1-1), and other recognized standards and Air Force regulations or instructions. Restricted public access to the proposed work sites would be provided through the use of signs and fencing. The construction contractor would also provide for the health and safety of workers and all subcontractors who may be exposed to their operations and services. The contractor would submit a health and safety plan to the base and appoint a formally trained individual to act as a safety officer. This person would be the point of contact for all issues regarding job site safety.

The results of an intrusive investigation for UXO conducted in June–July 2007 produced no evidence that the potential grenade court had ever been in use. None of the items recovered from any of the excavations—including those within CA-SBA-3741—were related to UXO or munitions; only one recovered item could be associated with military activities. Vandenberg AFB will request that a clean closure certificate be issued so the property can be transferred to the PO.

In designing the neighborhoods for the West Housing area, the PO would incorporate elements that minimize the potential for terrorist impacts, minimize access from surrounding communities, eliminate places of concealment, offer the most protection against crime, and discourage undesirable traffic.

Before new or renovated housing units are occupied by residents, the PO would be responsible for having a risk screening performed on a representative sampling of soil collected from disturbed areas around the housing, gardens, and children's play areas. In areas where the results exceed screening values for chlordane or lead, the PO would conduct a complete risk assessment and provide the results to the base for approval before the units could be occupied.

4.9.1.2 Long-Term Impacts

Replacement of the Capehart units with new construction and renovation of the MILCON units would have a positive impact on the health and safety of residents. These units would be of modern design and would be constructed to meet federal, state, and local building codes, standards, and regulations. In addition, any USTs encountered during the Initial Development Phase would be removed and the tank sites cleaned to meet applicable federal and state regulatory requirements.

4.9.2 Alternative 1

Safety and occupational health impacts to workers and residents under Alternative 1 would be similar to those described for the Proposed Action. Since a larger number of housing units would be demolished and a larger area of soil would likely be disturbed, there would be a greater potential for exposure to contaminants in soils.

4.9.3 No-Action Alternative

Under the No-Action Alternative, there would continue to be a risk to workers performing maintenance on Capehart housing units due to accidental exposure to asbestos and deteriorated plumbing and electrical systems. Residents in these units would potentially be exposed to lead-based paint and asbestos, as well as potential safety hazards posed by unsafe wiring and outdated fixtures.

4.9.4 Best Management Practices

With appropriate regulatory compliance, the project would have no impacts on public health and safety and no management measures would be required.

4.10 SOCIOECONOMIC FACTORS

A project that substantially altered the location and distribution of the region of influence (ROI) population, caused the population to exceed its historic growth rates, decreased jobs so as to substantially raise the regional unemployment rates or reduce income generation, substantially affected the local housing market and vacancy rates, or resulted in the need for new school services would be considered to have a significant impact.

4.10.1 Proposed Action

Compared to the populations in the Lompoc and Santa Maria valleys, and the county as a whole, any increase or decrease in the on-base population would be relatively small and would not have a negative impact on population in the area. Construction, demolition, and renovation activities during the Initial

Development Phase would create, rather than reduce, jobs, particularly in the construction sector. The available labor supply in the local area would be adequate to meet these requirements.

The intent of the Proposed Action is to provide a sufficient number of housing units to meet the projected shortfall of housing in the private sector. Results of the HRMA indicated there would be a shortfall of approximately 611 housing units in the private sector; by providing 867 on-base residences—in addition to retaining the 132 excess MILCON units—the housing area at Vandenberg AFB would adequately meet any housing shortfall in the private sector. In addition, under certain circumstances, the PO could rent vacant units to civilian employees at the base or other members of the general public, thereby potentially increasing the supply of local housing and having a beneficial impact.

There would be no need for new school services under the Proposed Action.

4.10.2 Alternative 1

Impacts under Alternative 1 would be similar to those described for the Proposed Action.

4.10.3 No-Action Alternative

Under the No-Action, the existing housing units would be retained. The 501 Capehart units would continue to deteriorate and would eventually become uninhabitable. Loss of these units from the current total inventory of 1,336 units would leave 835 residences. This is less than the required 867 MFH units indicated by the HRMA, which would result in a larger number of military families seeking housing in the local area. There could potentially be a negative impact on the local housing market as a result. In addition, if there is insufficient local housing for these families that is adequate and/or affordable, these military families may be faced with living in substandard quarters, paying more than they can afford for housing, or commuting long distances. All of these consequences would be counterproductive to the Air Force's goal of providing a living environment that supports the morale of its forces.

4.10.4 Best Management Practices

No socioeconomic impacts are anticipated; therefore no management measures would be required.

4.11 SOLID WASTE

Impacts from solid waste generation would be considered significant if they resulted in noncompliance with applicable regulatory guidelines or increased the amounts generated beyond available waste management capacities.

4.11.1 Proposed Action

4.11.1.1 Short-Term Impacts

Solid waste generated by construction, demolition, and renovation activities typically includes lumber, drywall, metals, masonry (e.g., brick and concrete), carpet, plastic, pipe, rocks, soil, paper, cardboard, and green waste related to land development. Many of these materials can be diverted from disposal in a landfill by reuse or recycling. This applies principally to wood, concrete, and drywall. Other items, such as appliances, windows, cabinetry, and plumbing fixtures can be salvaged for reuse; the process of dismantling building components for reuse or recycling is referred to as "deconstruction" (CIWMB 2007).

Estimated quantities of solid waste that would be generated by construction, demolition, and renovation activities (per house) are shown in Table 4-4. Combined, the solid waste from all three activities—construction, demolition, and renovation—would total 41,276.54 tons. For purposes of this analysis, it is assumed that the PO would choose to take all solid waste to the Vandenberg AFB landfill for disposal or (after being ground up) for reuse; however, the PO would also have the option of taking solid waste to an off-base location for disposal.

Table 4-4
Estimated C&D Debris Generated by Demolition, Construction, and Renovation Under the Proposed Action (in tons)

	Demolition	Construction	Renovation
Total number of houses	501	146	703
Total number of square feet	728,767	311,600[(a)]	N/A
Average square feet per house	1,454.63	1,900[(a)]	N/A
Pounds of waste per square foot	97.9[(b)]	4.38[(b)]	N/A
Total number of tons	35,673.14	682.40	4,921.00
Average tons, per house	71.20	4.16	7.00[(c)]

Notes: a Square footage based on gross square footage in programming benchmark provided in the Request for Proposal. The calculated number is an average of all types of units considered.
b Figures obtained from Franklin Associates 1998.
c Estimates of solid waste generated by remodeling vary substantially, depending on the type of work involved. For example, replacing the roof can generate over 2 tons of solid waste, remodeling a bathroom can generate nearly 1.5 tons of waste, and remodeling a kitchen can generate close to 5 tons of waste. For the Proposed Action, it was assumed the renovation would include more than one category of activity; in cases where it does not, the figure given here represents a conservative estimate.
N/A Not applicable; tonnage estimates are based on a per-house estimate, rather than square feet.

Table 4-5 shows the estimated quantities of C&D debris that would be generated each year during the Initial Development Period. The annual tonnage of C&D debris was converted to tons per day by dividing the annual amount by 250, the number of assumed workdays in a year. The estimates thus derived range from approximately 3.6 tons per day to approximately 41.2 tons per day.

Table 4-5
Estimated C&D Debris Generated Per Year Under the Proposed Action

Year	Demolition (tons)	Construction (tons)	Renovation (tons)	Total Tons Per Year	Total Tons Per Day
1	9,256.0	0	0	9,256.0	37.0
2	9,256.0	0	1,050.0	10,306.0	41.2
3	9,256.0	0	1,050.0	10,306.0	41.2
4	7,903.2	249.6	1,050.0	9,202.8	36.8
5	0	249.6	1,050.0	1,299.6	5.2
6	0	183.0	721.0	904.0	3.6

Under its Solid Waste Facility Permit, the Vandenberg AFB landfill is currently permitted to accept up to 400 tons per day of solid waste. The estimated amount of waste generated under the Proposed Action, when combined with other solid waste typically accepted at the landfill (approximately 40 to 50 tons per day), would be well within the limit of what could be disposed of at the base landfill.

The Vandenberg AFB Integrated Solid Waste Management Plan (Vandenberg AFB 2006) provides direction for managing solid waste generated on-base. One of the requirements in this plan, which is driven by state regulations and Air Force directives, is to reduce the amount of solid waste disposed of in the base landfill. California requirements, as mandated in the Integrated Waste Management Act of 1989, require a 50 percent reduction in the amount of solid waste entering landfills (using 1991 as a baseline year). The Department of Defense implemented similar requirements in fiscal year 1992, requiring an overall 40 percent reduction of solid waste disposal (using 1999 as a baseline year). Both of these requirements are applicable to Vandenberg AFB. Further, contractors performing work on the base are required to manage waste efficiently, divert as much C&D waste from landfill disposal as is reasonable, and to reuse or recycle materials to the extent feasible. The PO would be required to report to Vandenberg AFB the amount of construction and demolition debris that is diverted from disposal (i.e., waste that is taken off-base for recycling or reuse).

4.11.1.2 Long-Term Impacts

Throughout the Initial Development Phase and afterward, municipal solid waste and recyclables would continue to be collected from residents in the MFH area by a contractor. Solid waste would continue to be taken to the base landfill for disposal, and recyclables would be taken to an off-site location for processing.

4.11.2 Alternative 1

Estimated quantities of solid waste that would be generated by construction, demolition, and renovation activities under Alternative 1 are shown in Table 4-6. Combined, the solid waste from all three activities—construction, demolition, and renovation—would total 84,684.14 tons. For purposes of this analysis, it is assumed that the PO would choose to take all solid waste to the Vandenberg AFB landfill for disposal or (after being ground up) for reuse; however, the PO would also have the option of taking solid waste to an off-base location for disposal.

Table 4-7 shows the estimated quantities of C&D debris that would be generated each year during the Initial Development Period. The annual tonnage of C&D debris was converted to tons per day by dividing the annual amount by 250, the number of assumed workdays in a year. The estimates thus derived range from approximately 51.6 tons per day to approximately 62.3 tons per day. Although these estimates are higher than those calculated for the Proposed Action, they would still be within the limit of what could be disposed of at the base landfill.

Table 4-6
Estimated C&D Debris Generated by Demolition, Construction, and Renovation Under Alternative 1 (in tons)

	Demolition	Construction	Renovation
Total number of houses	1,253	784	83
Total number of square feet	1,651,500	1,489,600[a]	N/A
Average square feet per house	1,318.04	1,900[a]	N/A
Pounds of waste per square foot	97.9[b]	4.38[b]	N/A
Total number of tons	80,840.92	3,262.22	581.00
Average tons, per house	64.51	4.16	7.00[c]

Notes: a Square footage based on gross square footage in programming benchmark provided in the Request for Proposal. The calculated number is an average of all types of units considered.
b Figures obtained from Franklin Associates 1998.
c Estimates of solid waste generated by remodeling vary substantially, depending on the type of work involved. For example, replacing the roof can generate over 2 tons of solid waste, remodeling a bathroom can generate nearly 1.5 tons of waste, and remodeling a kitchen can generate close to 5 tons of waste. For the Proposed Action, it was assumed the renovation would include more than one category of activity; in cases where it does not, the figure given here represents a conservative estimate.
N/A Not applicable; tonnage estimates are based on a per-house estimate, rather than square feet.

Table 4-7
Estimated C&D Debris Generated Per Year Under Alternative 1

Year	Demolition (tons)	Construction (tons)	Renovation (tons)	Total Tons Per Year	Total Tons Per Day
1	12,902.0	0	0	12,902.0	51.6
2	12,902.0	748.8	0	13,650.8	54.6
3	12,902.0	748.8	0	13,650.8	54.6
4	14,837.3	748.8	0	15.586.1	62.3
5	14,837.3	748.8	0	15,586.1	62.3
6	12,450.4	266.2	581.0	13,031.4	52.1

4.11.2.1 Long-Term Impacts

Long-term impacts under Alternative 1 would be the same as those described for the Proposed Action.

4.11.3 No-Action Alternative

Under the No-Action Alternative, there would be no construction, demolition, or renovation. Quantities of solid waste generated by MFH residents would remain similar to current levels. Over the long-term, the amount of solid waste generated by routine maintenance activities could potentially increase, as the condition of the Capehart housing units deteriorates.

4.11.4 Best Management Practices

No short-term or long-term impacts on solid waste management would be expected from any of the alternatives. Therefore, no management measures are required.

4.12 TRAFFIC AND TRANSPORTATION

Project impacts on traffic and transportation would be considered significant if they caused an increase in traffic that was substantial in relation to existing traffic load and capacity of the street system; exceeded an established level of service standard; substantially increased hazards due to a design feature; resulted in inadequate emergency access; resulted in inadequate parking capacity; or conflicted with adopted policies, plans, or programs supporting alternative transportation.

4.12.1 Proposed Action

4.12.1.1 Short-Term Impacts

During the Initial Development Phase, segments of the housing area would undergo demolition and reconstruction; renovation of existing housing units would also occur. Increases to traffic would occur due to workers commuting to and from the work site; equipment used for construction, demolition, road grading, and paving; and trucks hauling construction and demolition debris or supplying construction materials. Construction workers would be expected to commute from nearby areas.

4.12.1.2 Long-Term Impacts

Since there would be an overall decrease in the number of housing units, no adverse impacts to traffic conditions would be expected. The amount of traffic in the West Housing area could potentially decrease from pre-construction levels.

Roadway design and traffic flow patterns would ensure adequate emergency access. The required specifications for new construction would ensure an adequate number of parking spaces.

4.12.2 Alternative 1

Short-term impacts under Alternative 1 would be somewhat greater than described for the Proposed Action due to the higher number of residences that would be demolished and constructed. Long-term impacts would be the same as described for the Proposed Action.

4.12.3 No-Action Alternative

Under the No-Action Alternative, the roadways would remain in their current configuration. Traffic conditions would remain the same as described in section 3.12.

4.12.4 Best Management Practices

To reduce traffic congestion at the Main Gate, particularly during peak traffic hours, the Utah Gate and/or Pine Canyon Gate could be used for access to the housing area by workers commuting to the site and by truck drivers delivering materials or removing debris. Traffic impacts would also be reduced by accomplishing the construction, demolition, and renovation in phases.

Scheduling workers in staggered work shifts will also partially reduce the amount of traffic congestion. Project-related traffic will follow specified routes at posted speed limits. Construction traffic near the elementary school will be curtailed between school opening and closing times.

4.13 UTILITIES

Impacts to utility systems from the proposed project would be considered significant if they exceeded the wastewater treatment requirements of the Regional Water Quality Control Board, required or resulted in the construction of new water or wastewater treatment facilities or expansion of existing facilities, or required or resulted in the construction of new storm water drainage facilities or expansion of existing facilities. Impacts would also be considered significant if they resulted in a requirement for utility supplies (such as water, natural gas, or electricity) that could not be met by existing entitlements or resources.

Construction of upgrades at the Lompoc Regional Wastewater Reclamation Plant commenced in April 2007; the project is estimated to take 27 months to complete (City of Lompoc 2007). Because Vandenberg AFB is one of the areas served by the plant, the installation pays a fee for its services. The PO would be responsible for reimbursing the base for the project's proportionate share of the fee paid by Vandenberg AFB, based on the amount of wastewater generated by the housing area.

4.13.1 Proposed Action

4.13.1.1 Short-Term Impacts

In areas where housing units are to be demolished and replaced with new units, utility lines would be realigned to follow new street patterns and neighborhood designs. Utility structures in poor condition would be replaced, and all overhead utility lines would be removed and installed underground, including the overhead power lines in "Power Alley." All new utility lines would also be installed underground.

Current facility blueprints or as-built drawings should be used to estimate the location of underground utilities. Prior to any demolition or ground disturbance, the PO would be required to complete and submit an Air Force Form 103, Base Civil Engineer Work Request (also called a dig permit), which would require the notification of the Utilities Shop and the Communications Squadron of the particular project.

During the Initial Development Period, there is a potential for brief interruptions in utility service in the housing area as utility lines are relocated from overhead to underground, as underground utilities are rerouted, or in the unlikely event of an accident. To the extent feasible, residents would be informed in advance of any anticipated interruptions in utility service.

4.13.1.2 Long-Term Impacts

After the Initial Development Period, utility consumption in the West Housing area would remain at previous levels and could possibly decrease. Electricity and natural gas use could be reduced by the installation of more energy efficient appliances; water use and wastewater generation could be similarly reduced. In addition, the decrease in the number of housing units from 1,336 to 999 (the 867 newly constructed/renovated units plus the 132 retained MILCON units) would make it likely that utility use would further decrease overall.

4.13.2 Alternative 1

Short-term and long-term (pre– and post–Initial Development Period) impacts would be the same as described for the Proposed Action. It is possible that utility use could decrease even more by the construction of more new, energy-efficient housing units than under the Proposed Action and by the lower number of residences (867 under this alternative) at final buildout compared to the current inventory.

4.13.3 No-Action Alternative

There would be no change in utility requirements under the No-Action Alternative.

4.13.4 Best Management Practices

No management measures would be required. Potential decreases in utility usage under the Proposed Action and Alternative 1 could have beneficial impacts.

4.14 WATER RESOURCES

Impacts to water resources would be considered significant if they caused substantial flooding or erosion; adversely affected any significant water body, such as a stream, lake, or bay; exposed people to reasonably foreseeable hydrologic hazards such as flooding or tsunamis; or adversely affected surface water or groundwater quality or quantity. The 100-year recurrence interval for floodplains, tsunami runup, and tidal flood hazards is used as the significance criterion for those aspects of the study. Impacts would also be considered significant if they violated any water quality standards or waste discharge requirements, substantially depleted groundwater supplies or interfered with groundwater recharge, or substantially altered the existing drainage pattern of the site or area.

Under the requirements of the General Permit, the PO would be responsible for applying for a construction storm water permit and would also be required to prepare and submit to the CCRWQCB a Storm Water Pollution Prevention Plan (SWPPP).

4.14.1 Proposed Action

4.14.1.1 Short-Term Impacts

Polluted storm water runoff from construction sites often flows to storm drains and ultimately into local rivers and streams (County of Santa Barbara 2002). Even if the runoff does not contain harmful chemicals, it typically carries large amounts of sediment which, when deposited in streams, can cause physical, chemical, and biological harm to the receiving waters. Given the current drainage patterns and storm drainage system in the West Housing area, storm water runoff ultimately flows into either San Antonio Creek or the Santa Ynez River. Excess sediment in either of these water bodies would increase turbidity and reduce light penetration in the water column and could have more long-term effects on habitat. Any pollutants carried in this runoff, including pesticides, concrete truck washout, construction chemicals, and construction debris, would also negatively affect these water bodies.

Soil disturbance by demolition and construction of housing units, road realignment, underground utility placement, and grading would have the potential to moderately to slightly impact surface water resources. Implementation of BMPs would be needed to prevent storm water runoff from construction areas from entering the storm drainage system in the housing area. Compliance with 30 SW Plan 32-7041-C, *Storm*

Water Management Plan, would ensure that construction activities do not contribute pollutants to the storm sewer system.

The area to be disturbed at any given time would be greater than 1 acre. This means the PO would be required to submit to the CCRWQCB a Notice of Intent to comply with the state general permit for storm water discharges under the NPDES. Since the project would be implemented in phases, the number of acres disturbed would be minimized.

The Proposed Action would have a negligible impact on groundwater resources. Leaks and spills of hazardous materials may inevitably occur during demolition and construction activities; however, these are expected to be minor. All hazardous materials used by the PO and any wastes generated, would be managed in accordance with applicable federal, state, and local laws and regulations and the Vandenberg AFB Hazardous Materials Management Plan and Hazardous Waste Management Plan, which identify the requirements and procedures for proper management of hazardous substances at Vandenberg AFB. Removal of any leaking USTs and/or contaminated soil that are encountered during construction activities would have a beneficial impact on groundwater resources.

4.14.1.2 Long-Term Impacts

Any soil-disturbing activities occurring after the Initial Development Period would probably occur on areas of less than 1 acre; therefore any potential impacts to surface water would be less than significant. As appropriate, implementation of BMPs to reduce the possibility of contaminant or sediment transport to surface waters and adherence to requirements for managing hazardous substances would preclude any impacts to surface water and groundwater. Continued compliance with 30 SW Plan 32-7041-C, *Storm Water Management Plan*, would ensure that grounds maintenance, other maintenance activities, and occupant activities would not contribute pollutants to the storm sewer system.

The Proposed Action would not be located in an area that is susceptible to flooding or tsunamis. As discussed in section 3.3.4, the West Housing area is approximately 5 miles from the Pacific Ocean and is at an elevation ranging from 400 to 550 feet above msl, making it unlikely to be affected by tsunami runup or tidal flooding. The Proposed Action would not be situated on a floodplain.

4.14.2 Alternative 1

Potential impacts to surface waters under Alternative 1 would be similar to those described for the Proposed Action. The amount of soil disturbance could potentially be greater than under the Proposed Action due to the larger number of housing units that would be demolished and constructed. However, the implementation of appropriate BMPs would reduce potential water quality impacts to insignificant levels.

4.14.3 No-Action Alternative

There would be no change in water resources under the No-Action Alternative.

4.14.4 Best Management Practices

Through implementation of appropriate structural and non-structural BMPs, impacts will be reduced to below significant levels. Structural BMPs will include, but not be limited to, maintaining and/or increasing open space, minimizing impervious surfaces and directly connected impervious areas, and minimizing disturbance of soils and vegetation. Non-structural BMPs will include, but not be limited to,

storage practices such as wet ponds and extended-detention outlet structures; filtration practices such as grassed swales, sand filters, and filter strips; and infiltration practices such as infiltration basins and infiltration trenches.

Completion of construction, demolition, renovation, landscaping, utility relocation, and other ground-disturbing activities in phases will also reduce impacts. Phased activities would limit the area that is disturbed at any given time.

4.15 CUMULATIVE IMPACTS

The CEQ regulations define "cumulative impact" as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

The ROI for the cumulative impacts analysis includes Vandenberg AFB. This section addresses the potential additive effects of implementing the Proposed Action or Alternative 1 in combination with the projects identified below. No significant impacts have been identified for the alternatives identified in this EA. The only areas with potential cumulative impacts include air quality and solid waste.

4.15.1 Past, Present, and Reasonably Foreseeable Actions in the Region of Influence

Current programs recently evaluated and shown to have no significant impact include:

- Demolition of housing units in the East Housing area; and
- "Heritage" demolition program.

In addition, with the ending of the Titan program at Vandenberg AFB, Space Launch Complex 4 West is no longer in use and has been decommissioned. This facility remains in place, but there is a potential that it could be scheduled for demolition in the future.

4.15.2 Cumulative Impacts on the Resources

The projects identified in section 4.15.1 may be implemented during the same time frame as this action. They are not expected to have any significant cumulative air quality impacts. Air quality impacts from these projects do not individually result in any significant, long-term impacts.

Solid waste issues have been mitigated to the maximum extent feasible by requiring recycling of a large percentage of demolition materials. Should the amounts of solid waste brought to the base landfill from a combination of demolition projects exceed the total permitted daily limit, they could be stockpiled at another location and transferred to the landfill at a later time.

4.16 UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts include those impacts that are negative, occurring regardless of any identified minimization measures. The Proposed Action and Alternative 1 would result in short-term air quality, noise, and traffic impacts. However, these impacts would be localized and would be minimal.

4.17 SHORT-TERM VERSUS LONG-TERM PRODUCTIVITY OF THE ENVIRONMENT

Examples of short-term uses of the environment include direct, construction-related disturbances and direct impacts associated with an increase in population and activity that occurs over a period typically less than 5 years. Long-term uses of the environment include impacts occurring over a period of time of more than 5 years, including permanent resource loss.

Although impacts related to the Initial Development Phase of the Proposed Action and Alternative 1 would be expected, there would be no long-term changes in the productivity of the environment. The number of housing units at final build out would be lower than the present number, with the result that there could be some minor beneficial impacts such as reduced traffic, noise, municipal solid waste generation, and utility consumption.

4.18 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible and irretrievable resource commitments are related to the use of nonrenewable natural resources and the effects that the use of those resources will have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy or minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of implementing an action (e.g., extinction of a rare or threatened species, or the disturbance of an important cultural resource site). In accordance with NEPA (40 CFR 1502.16), this section includes a discussion of any irreversible and irretrievable commitment of resources associated with the proposed project.

This EA addresses the demolition, construction, and renovation of MFH in the West Housing area of Vandenberg AFB. Implementing either of the proposed actions would not require an irreversible or irretrievable commitment of resources as long as appropriate management measures are implemented at the same time. Without these measures, there is the potential for disturbance of the cultural resources sites, particularly the one in Parcel B, which would result in an irretrievable commitment of resources. Implementation of the No-Action Alternative would also not require an irreversible or irretrievable commitment of resources.

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8.0 ACRONYMS AND ABBREVIATIONS

30 CES/CEOEC	Service Contracts
30 CES/CEVNC	Cultural Resources section
30 CEV	30th Civil Engineer Squadron
30 MDG	30th Medical Group
30 MSG	30th Mission Support Group
30 SFS	30th Security Forces Squadron
AADT	annual average daily traffic
AB	Assembly Bill
ACM	asbestos-containing material
AFB	Air Force Base
AFI	Air Force Instruction
AFPPP	Air Force Pollution Prevention Plan
AOC	area of concern
APE	area of potential effects
BAH	Basic Allowance for Housing
bgs	below ground surface
BMP	best management practice
BOE	Board of Equalization
BTEX	benzene, toluene, ethylbenzene, and xylene
C&D	construction and demolition
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
Cal/EPA	California Environmental Protection Agency
Caltrans	California Department of Transportation
CAM	Condition Assessment Matrix
CCR	California Code of Regulations
CCRWQCB	Central Coast Regional Water Quality Control Board
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Restoration, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIWMB	California Integrated Waste Management Board
CNDDB	California Department of Fish and Game Natural Diversity Data Base
CNEL	community noise equivalent level
dB	decibel(s)
dBA	A-weighted decibel(s)
DCA	1,2-dichoroethane
DDS	Drum Disposal Site
DNL	day-night average noise level
DOD	Department of Defense
DTSC	Department of Toxic Substances Control
EA	Environmental Assessment

EDB	1,2-dibromoethane
EIAP	Environmental Impact Analysis Process
ESA	Endangered Species Act
F	Fahrenheit
FONSI	Finding of No Significant Impact
FY	fiscal year
GIS	geographic information system
GOQ	General Officer Quarters
GSA	General Services Administration
HCP	Housing Community Profile
HMMIS	Hazardous Materials Management Information System
HRMA	Housing Requirements and Market Analysis
Hz	Hertz
ICRMP	Integrated Cultural Resources Management Plan
IRP	Installation Restoration Program
LBP	lead-based paint
Leq	long-term equivalent A-weighted sound level
MEC	munitions and explosives of concern
MFH	military family housing
MGD	million gallons per day
MHPI	Military Housing Privatization Initiative
MILCON	military construction
MMR	Military Munitions Rule
MS4	municipal separate storm sewer system
msl	mean sea level
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
ODS	ozone-depleting substance
OSD	Office of the Secretary of Defense
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PG&E	Pacific Gas and Electric
$PM_{2.5}$	particulate matter 2.5 microns or less in diameter
PM_{10}	particulate matter 10 microns or less in diameter
PO	Project Owner
POW	prisoner of war
ppm	parts per million

RCRA	Resource Conservation and Recovery Act
ROC	reactive organic compound
SAIC	Science Applications International Corporation
SBCAPCD	Santa Barbara County Air Pollution Control District
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SOQ	Senior Officer Quarters
STLC	soluble threshold limit concentration
SWDR	Solid Waste Disposal Report
SWFP	Solid Waste Facility Permit
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TCLP	Toxicity Characteristic Leaching Procedure
TPQ	Threshold Planning Quantity
TSCA	Toxic Substances Control Act
U.S. EPA	United States Environmental Protection Agency
U.S.C.	United States Code
USACERL	United States Army Construction Engineering Research Laboratory
UST	underground storage tank
UXO	unexploded ordnance
WDR	Waste Discharge Requirement

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APPENDIX A: AIR QUALITY CONFORMITY ANALYSIS

APPENDIX A
AIR QUALITY ANALYSIS

1.0 CONFORMITY DETERMINATION

1.1 EMISSION THRESHOLDS AND QUANTIFICATION

The emission threshold for determining conformity is based on the National Ambient Air Quality Standards (NAAQS) attainment standard for Santa Barbara County. The NAAQS classification for Santa Barbara County is attainment for all criteria pollutants. The attainment status and corresponding thresholds listed in Table A-1 were used to determine general conformity.

Emission quantification is defined as the sum of all direct and indirect criteria pollutants and precursor emissions, including stationary and mobile emission sources. Direct and indirect emissions are distinguished by timing and location rather than the type of emission source. Direct emissions occur at the same time and place as the federal action. Indirect emissions include those that may occur later or at a distance from the federal action. General conformity limits the scope of indirect emissions to those that can be quantified and are reasonably foreseeable by the federal agency at the time of analysis, and those which the federal agency can practicably control through its continuing program responsibility.

1.2 EVALUATING CONFORMITY AND REPORTING REQUIREMENTS

General conformity rule applies to federal actions that are not covered by transportation conformity rule, with several listed exceptions. Other than the listed exemptions and presumptions of conformity, general conformity applies to actions in which projected emissions exceed applicable conformity *de minimis* thresholds. However, if the emissions from a federal action do not equal or exceed *de minimis* thresholds but do represent 10 percent or more of a nonattainment or maintenance area's total emissions of any criteria pollutant, the action is considered “regionally significant” and the requirements of conformity determination apply.

The reporting requirements for the conformity analysis are not required if the proposed project's direct and indirect emissions are less than the established *de minimis* thresholds and are not considered regionally significant.

1.3 AIR QUALITY JURISDICTION AND ATTAINMENT STATUS

The proposed project would take place in the North Base section of Vandenberg Air Force Base (AFB) in Santa Barbara County, California. The proposed project is subject to Santa Barbara County Air Pollution Control District (SBCAPCD) rules, regulations, and jurisdiction.

United States Environmental Protection Agency (U.S. EPA) threshold limits used to determine general conformity are listed in Table A-1.

Table A-1
U.S. EPA Threshold Limits Used to Determine General Conformity in Maintenance Areas

Criteria Pollutant	Threshold Level (tons/yr)
Ozone (NO_x), SO_2, or NO_2	
All Maintenance areas	100
Ozone (VOCs)	
Maintenance areas inside an ozone transport region	50
Maintenance areas outside an ozone transport region	100
Carbon monoxide	
All maintenance areas	100
PM_{10}	
All maintenance areas	100
Pb	25

Source: SBCAPCD (Rule 702)

1.4 SBCAPCD EMISSIONS SUMMARY

The SBCAPCD 2002 Annual Emission Inventory, as listed in the Draft 2007 CAP, was compared with the total emissions generated from construction, demolition, and renovation activities associated with the proposed Military Family Housing privatization program at Vandenberg AFB. This comparison was performed to determine whether the proposed project would be "regionally significant." The SBCAPCD 2002 Annual Emission Inventory is listed in Table A-2.

Table A-2
2002 Annual Planning Emission Inventory
SBCAPCD Summary of Emissions, Major Source Categories

Source	NO_x	VOC
Stationary Source Area and Point Sources (tons/yr)	3,161	7,563
Mobile Sources (tons/yr)	12,069	6,969
Outer Continental Shelf Stationary and Mobile Sources (tons/yr)	14,341	1,251
Total	**29,571**	**15,783**

Source: SBCAPCD Draft 2007 Clean Air Plan.

Outer Continental Shelf (OCS) sources are part of the SBCAPCD jurisdiction and the county emission inventory; therefore, OCS emission sources are included in the total emissions when determining whether the Proposed Action is regionally significant.

1.5 WORST CASE EMISSIONS AND CONFORMITY DETERMINATION

The attainment status of Santa Barbara County and the corresponding threshold of 100 tons per year for ozone are used to determine general conformity. Table A-3 shows a comparison of the estimated annual project emissions with the threshold levels. The project emissions shown here are from the year in which the largest quantity of emissions was estimated to occur, thus they represent a "worst case" quantity. In both cases, the estimated emissions are substantially below the conformity threshold. The terms volatile organic compound (VOC) and reactive organic gas (ROG) are considered equivalent.

Table A-3
Construction Project Emissions
at Vandenberg AFB

Emissions	NO_x (tons/yr)	VOC (tons/yr)
Project emissions	7.98[1]	3.82[1]
Conformity threshold	100	100
Significance	No	No

Note: 1 - Proposed project emissions for NO_x and VOC are obtained from Table A-5.

A comparison among the SBCAPCD 1999 Annual Emissions Inventory, the proposed project emissions, and the latter as percent of the former is shown in Table A-4.

Table A-4
Comparison of SBCAPCD 2002 Annual Emission Inventory
and Proposed Project Emissions

Source Summary	NO_x	VOC
SBCAPCD 2002 Annual Emission Inventory (tons/yr)	29,571	15,783
Proposed Project Emissions (tons/yr)	7.98	3.82
Percent of SBCAPCD 2002 Annual Emission Inventory (%)	<1.00	<1.00
Percent Conformity Threshold (%)	10	10
Significance	No	No

2.0 TECHNICAL ASSUMPTIONS

Emissions calculations were performed using URBEMIS 2007 version 9.2.0. Technical assumptions were made to run URBEMIS and calculate emissions from the Proposed Action. Three separate URBEMIS runs (one for each of demolition, renovation, and new construction phases) were performed to calculate emissions associated with the construction activities of the Proposed Action. The URBEMIS runs were executed to calculate emissions from demolition of 501 units; construction of 164 new units, and renovation of 703 units. URBEMIS input data and results are included in Tables A-5 through A-14 of this conformity determination.

Note: The URBEMIS program requires that an actual date be entered for each year. For purposes of this analysis, Year 1 of the Initial Development Period was assumed to be 2009, Year 2 was assumed to be 2010, Year 3 to be 2011, Year 4 to be 2012, Year 5 to be 2013, and Year 6 to be 2014. Hence, the modeling results presented in Tables A-6 through A-14 show the years 2009 through 2014 rather than Year 1 through Year 6.

2.1 DEMOLITION OF EXISTING HOUSING UNITS

The following URBEMIS entries were made to calculate demolition-related emissions:

- 501 single family units are demolished over a 42-month period, approximately.
- Demolition starts in Year 1 of the Initial Development Period (2009).
- Total volume of all buildings is estimated based on the total building area of 728,767 square feet. The total area was calculated by adding up all of the units assigned to be demolished as identified in the Vandenberg AFB MFH Inventory. To calculate the total volume, URBEMIS requires total width, total length and total height. Total width and total length are estimated by taking the square root of the total area (square root of [728,726 square feet] = 853.7 square feet). URBEMIS allows only one decimal place for with and length entries. Therefore, the total volume as calculated by URBEMIS is slightly different than it would be in a spreadsheet software package such as Microsoft Excel, which preserves the result of a calculation down to several decimal places. The height is assumed to be 10 feet, based on the approximate height of a one-story building.
- To estimate the maximum daily volume of buldings to be demolished concurrently URBEMIS requires daily maximum width and length. Maximum daily width and length are estimated based on the total building area (from the previous bullet) and the number of workdays estimated for the demolition. The daily maximum width and length are calculated to be 26.8 square feet as follows:

Total Area (square feet)	**Number of months to complete the demolition**	**Number of working days per month**	**Daily Area in square feet (Total Area)/[(number of months)x(number of days in a month)]**	**Square Root of Daily Area (square feet)**
728,726	46.2	22	7,16.97	26.8

- Capacity of a hauling truck is the URBEMIS default of 20 cubic yards.
- Demolition debris would be disposed of at the base landfill.
- Each round trip would be approximately 4 miles.
- One processing/crushing piece of equipment and one front loader would be used at a rate of 8 hours every working day.
- Recommended mitigation measures are based on URBEMIS options and include use of aqueous diesel fuel, diesel particulate filters, and diesel oxidation catalysts on off-road diesel equipment.

2.2 CONSTRUCTION OF NEW HOUSING UNITS

The following URBEMIS entries were made to calculate construction-related emissions:

- A total of 164 single family housing units would be built over a three-year period.
- The new construction would begin in Year 4 of the Initial Development Period (2012).
- URBEMIS defaults were used for total and daily site grading fugitive dust emissions, and site grading equipment. No soil hauling would be expected.
- No asphalt paving would be expected.
- URBEMIS default values were used for worker trips.
- URBEMIS default values were used for building construction equipment. Building construction equipment would be one crane, one generator set, one tractor/loader/backhoe two forklifts, and three welders. Each piece of equipment would operate between 7 and 8 hours per day during each day of structure construction.
- URBEMIS default values were used for architectural coating parameters.
- No additional operation emissions would result. Overall operation emissions would be expected to be reduced, since the Proposed Action would have fewer housing units at buildout.
- Recommended mitigation measures are based on URBEMIS options and include use of aqueous diesel fuel, diesel particulate filters, and diesel oxidation catalysts on off-road diesel equipment.

2.3 RENOVATION OF EXISTING HOUSING UNITS

- A total of 703 existing units would be renovated over a five-year period.
- Renovation would start in Year 2 of the Initial Development Period (2010).
- URBEMIS default values were used for worker trips. Building construction equipment would consist of one forklift, one tractor/loader/backhoe unit, one crane, and one generator set operating for 2 hours during each day of the renovation phase.
- URBEMIS default values were used for architectural coating parameters.
- No additional operation emissions would result. Overall operation emissions would be expected to be reduced, since the Proposed Action would have fewer housing units at buildout.
- Recommended mitigation measures are based on URBEMIS options and include use of aqueous diesel fuel, diesel particulate filters, and diesel oxidation catalysts.

Table A-5
Emissions From All Phases by Year

Year	Activity	ROG (tons/yr)	NO_X (tons/yr)	CO (tons/yr)	SO_2 (tons/yr)	PM_{10} (tons/yr)
1	Demolition	0.25	1.37	0.99	0.00	0.40
2	Demolition and Renovation	1.25	5.51	20.74	0.01	0.61
3	Demolition and Renovation	2.37	5.06	19.41	0.01	0.60
4	Demolition, Renovation, and New Construction	2.94	7.98	22.53	0.02	4.67
5	Renovation and New Construction	3.82	5.21	20.93	0.02	0.23
6	Renovation and New Construction	2.06	3.13	12.85	0.01	0.15

Table A-6
Demolition 501 Units Summary

7/13/2007 03:26:15 PM
Urbemis 2007 Version 9.2.0
Summary Report for Annual Emissions (Tons/Year)
File Name: H:\AQ_\VAFB_MFH_WEST\URBEMIS RECALC\Demolition.urb9
Project Name: MFH
Project Location: Santa Barbara County APCD
On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2009 TOTALS (tons/year unmitigated)	0.25	1.87	0.99	0.00	0.39	0.12	0.51	0.08	0.11	0.19	161.76
2009 TOTALS (tons/year mitigated)	0.25	1.37	0.99	0.00	0.39	0.01	0.40	0.08	0.01	0.09	161.76
Percent Reduction	0.00	26.90	0.00	0.00	0.00	90.98	21.56	0.00	90.99	52.64	0.00
2010 TOTALS (tons/year unmitigated)	0.24	1.78	0.99	0.00	0.39	0.12	0.51	0.08	0.11	0.19	163.01
2010 TOTALS (tons/year mitigated)	0.24	1.30	0.99	0.00	0.39	0.01	0.40	0.08	0.01	0.09	163.01
Percent Reduction	0.00	26.93	0.00	0.00	0.00	91.05	20.64	0.00	91.07	51.40	0.00
2011 TOTALS (tons/year unmitigated)	0.22	1.66	0.98	0.00	0.39	0.11	0.50	0.08	0.10	0.18	162.38
2011 TOTALS (tons/year mitigated)	0.22	1.21	0.98	0.00	0.39	0.01	0.40	0.08	0.01	0.09	162.38
Percent Reduction	0.00	26.96	0.00	0.00	0.00	91.14	19.90	0.00	91.16	50.36	0.00
2012 TOTALS (tons/year unmitigated)	0.16	1.23	0.77	0.00	0.31	0.08	0.39	0.06	0.07	0.14	128.66
2012 TOTALS (tons/year mitigated)	0.16	0.89	0.77	0.00	0.31	0.01	0.32	0.06	0.01	0.07	128.66
Percent Reduction	0.00	27.00	0.00	0.00	0.00	91.19	18.55	0.00	91.21	48.37	0.00

Table A-7
Demolition 501 Units Unmitigated

7/16/2007 02:50:22 PM
Urbemis 2007 Version 9.2.0
Detail Report for Annual Construction Unmitigated Emissions (Tons/Year)
File Name: H:\AQ_\VAFB_MFH_WEST\URBEMIS RECALC\Demolition.urb9
Project Name: MFH
Project Location: Santa Barbara County APCD
On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006
Off-Road Vehicle Emissions Based on: OFFROAD2007
Construction Emission Estimates (Annual tons per year, unmitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
2009	0.25	1.87	0.99	0.00	0.39	0.12	0.51	0.08	0.11	0.19	161.76
Demolition 01/05/2009–10/15/2012	0.25	1.87	0.99	0.00	0.39	0.12	0.51	0.08	0.11	0.19	161.76
Fugitive Dust	0.00	0.00	0.00	0.00	0.40	0.00	0.40	0.08	0.00	0.08	0.00
Demo Off Road Diesel	0.25	1.81	0.95	0.00	0.00	0.12	0.12	0.00	0.11	0.11	154.54
Demo On Road Diesel	0.00	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.93
Demo Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29
2010	0.24	1.78	0.99	0.00	0.39	0.12	0.51	0.08	0.11	0.19	163.01
Demolition 01/05/2009–10/15/2012	0.24	1.78	0.99	0.00	0.39	0.12	0.51	0.08	0.11	0.19	163.01
Fugitive Dust	0.00	0.00	0.00	0.00	0.41	0.00	0.41	0.08	0.00	0.08	0.00
Demo Off Road Diesel	0.24	1.73	0.96	0.00	0.00	0.11	0.11	0.00	0.10	0.10	155.74
Demo On Road Diesel	0.00	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.99
Demo Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29
2011	0.22	1.66	0.98	0.00	0.39	0.11	0.50	0.08	0.10	0.18	162.38
Demolition 01/05/2009–10/15/2012	0.22	1.66	0.98	0.00	0.39	0.11	0.50	0.08	0.10	0.18	162.38
Fugitive Dust	0.00	0.00	0.00	0.00	0.40	0.00	0.40	0.08	0.00	0.08	0.00
Demo Off Road Diesel	0.22	1.62	0.95	0.00	0.00	0.11	0.11	0.00	0.10	0.10	155.14
Demo On Road Diesel	0.00	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.96
Demo Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28

Table A-7 (continued)
Demolition 501 Units Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
2012	0.16	1.23	0.77	0.00	0.31	0.08	0.39	0.06	0.07	0.14	128.66
Demolition 01/05/2009–10/15/2012	0.16	1.23	0.77	0.00	0.31	0.08	0.39	0.06	0.07	0.14	128.66
Fugitive Dust	0.00	0.00	0.00	0.00	0.32	0.00	0.32	0.07	0.00	0.07	0.00
Demo Off Road Diesel	0.16	1.19	0.75	0.00	0.00	0.08	0.08	0.00	0.07	0.07	122.92
Demo On Road Diesel	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.52
Demo Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22

Phase Assumptions

Phase: Demolition 1/5/2009–10/15/2012 - Demolition of 501 units
Building Volume Total (cubic feet): 7288037
Building Volume Daily (cubic feet): 7182.4
On Road Truck Travel (VMT): 13.3
Off-Road Equipment:
1 Crushing/Processing Equip (142 hp) operating at a 0.78 load factor for 8 hours per day
1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

Table A-7, Page 2 of 2

Table A-8
Demolition 501 Units Mitigated

7/16/2007 02:50:44 PM
Urbemis 2007 Version 9.2.0
Detail Report for Annual Construction Mitigated Emissions (Tons/Year)
File Name: H:\AQ_\VAFB_MFH_WEST\URBEMIS RECALC\Demolition.urb9
Project Name: MFH
Project Location: Santa Barbara County APCD
On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006
Off-Road Vehicle Emissions Based on: OFFROAD2007
Construction Emission Estimates (Annual tons per year, mitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
2009	0.25	1.37	0.99	0.00	0.39	0.01	0.40	0.08	0.01	0.09	161.76
Demolition 01/05/2009–10/15/2012	0.25	1.37	0.99	0.00	0.39	0.01	0.40	0.08	0.01	0.09	161.76
Fugitive Dust	0.00	0.00	0.00	0.00	0.40	0.00	0.40	0.08	0.00	0.08	0.00
Demo Off Road Diesel	0.25	1.31	0.95	0.00	0.00	0.01	0.01	0.00	0.01	0.01	154.54
Demo On Road Diesel	0.00	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.93
Demo Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29
2010	0.24	1.30	0.99	0.00	0.39	0.01	0.40	0.08	0.01	0.09	163.01
Demolition 01/05/2009–10/15/2012	0.24	1.30	0.99	0.00	0.39	0.01	0.40	0.08	0.01	0.09	163.01
Fugitive Dust	0.00	0.00	0.00	0.00	0.41	0.00	0.41	0.08	0.00	0.08	0.00
Demo Off Road Diesel	0.24	1.25	0.96	0.00	0.00	0.01	0.01	0.00	0.01	0.01	155.74
Demo On Road Diesel	0.00	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.99
Demo Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29
2011	0.22	1.21	0.98	0.00	0.39	0.01	0.40	0.08	0.01	0.09	162.38
Demolition 01/05/2009–10/15/2012	0.22	1.21	0.98	0.00	0.39	0.01	0.40	0.08	0.01	0.09	162.38
Fugitive Dust	0.00	0.00	0.00	0.00	0.40	0.00	0.40	0.08	0.00	0.08	0.00
Demo Off Road Diesel	0.22	1.17	0.95	0.00	0.00	0.01	0.01	0.00	0.01	0.01	155.14
Demo On Road Diesel	0.00	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.96
Demo Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28

Table A-8 (continued)
Demolition 501 Units Mitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
2012	0.16	0.89	0.77	0.00	0.31	0.01	0.32	0.06	0.01	0.07	128.66
Demolition 01/05/2009–10/15/2012	0.16	0.89	0.77	0.00	0.31	0.01	0.32	0.06	0.01	0.07	128.66
Fugitive Dust	0.00	0.00	0.00	0.00	0.32	0.00	0.32	0.07	0.00	0.07	0.00
Demo Off Road Diesel	0.16	0.86	0.75	0.00	0.00	0.01	0.01	0.00	0.01	0.01	122.92
Demo On Road Diesel	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.52
Demo Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Demolition 1/5/2009–10/15/2012 - Demolition of 501 units
For Crushing/Processing Equip, the Use Aqueous Diesel Fuel mitigation reduces emissions by:
NOX: 15% PM10: 50% PM2.5: 50%
For Crushing/Processing Equip, the Diesel Particulate Filter (DPF) 1st Tier mitigation reduces emissions by:
PM10: 85% PM2.5: 85%
For Crushing/Processing Equip, the Diesel Oxidation Catalyst 15% mitigation reduces emissions by:
NOX: 15%
For Tractors/Loaders/Backhoes, the Use Aqueous Diesel Fuel mitigation reduces emissions by:
NOX: 15% PM10: 50% PM2.5: 50%
For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 1st Tier mitigation reduces emissions by:
PM10: 85% PM2.5: 85%
For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 15% mitigation reduces emissions by:
NOX: 15%

Phase Assumptions

Phase: Demolition 1/5/2009–10/15/2012 - Demolition of 501 units
Building Volume Total (cubic feet): 7288037
Building Volume Daily (cubic feet): 7182.4
On Road Truck Travel (VMT): 13.3
Off-Road Equipment:
1 Crushing/Processing Equip (142 hp) operating at a 0.78 load factor for 8 hours per day
1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

Table A-8, Page 2 of 2

Table A-9
Renovation 703 Units Summary

7/16/2007 10:31:20 AM
Urbemis 2007 Version 9.2.0
Summary Report for Annual Emissions (Tons/Year)
File Name: H:\AQ_\VAFB_MFH_WEST\URBEMIS RECALC\Renovation.urb9
Project Name: MFH Renovation
Project Location: Santa Barbara County APCD
On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2010 TOTALS (tons/year unmitigated)	1.01	4.36	19.75	0.01	0.08	0.16	0.23	0.03	0.14	0.17	1,616.65
2010 TOTALS (tons/year mitigated)	1.01	4.21	19.75	0.01	0.08	0.13	0.20	0.03	0.11	0.14	1,616.65
Percent Reduction	0.00	3.27	0.00	0.00	0.00	19.54	13.12	0.00	20.16	16.86	0.00
2011 TOTALS (tons/year unmitigated)	5.91	3.98	18.43	0.01	0.08	0.15	0.22	0.03	0.13	0.16	1,621.28
2011 TOTALS (tons/year mitigated)	2.15	3.85	18.43	0.01	0.08	0.12	0.20	0.03	0.10	0.13	1,621.28
Percent Reduction	63.61	3.37	0.00	0.00	0.00	19.97	13.09	0.00	20.65	17.06	0.00
2012 TOTALS (tons/year unmitigated)	5.86	3.62	17.16	0.01	0.08	0.14	0.21	0.03	0.12	0.15	1,627.29
2012 TOTALS (tons/year mitigated)	2.09	3.50	17.16	0.01	0.08	0.11	0.19	0.03	0.10	0.12	1,627.29
Percent Reduction	64.28	3.50	0.00	0.00	0.00	19.62	12.51	0.00	20.37	16.59	0.00
2013 TOTALS (tons/year unmitigated)	5.78	3.26	15.88	0.01	0.08	0.13	0.20	0.03	0.11	0.14	1,627.15
2013 TOTALS (tons/year mitigated)	2.01	3.15	15.88	0.01	0.08	0.10	0.18	0.03	0.09	0.12	1,627.15
Percent Reduction	65.21	3.63	0.00	0.00	0.00	19.07	11.78	0.00	19.86	15.90	0.00
2014 TOTALS (tons/year unmitigated)	3.79	1.94	9.72	0.01	0.05	0.08	0.13	0.02	0.07	0.09	1,078.48
2014 TOTALS (tons/year mitigated)	1.01	1.87	9.72	0.01	0.05	0.06	0.11	0.02	0.05	0.07	1,078.48
Percent Reduction	73.27	3.75	0.00	0.00	0.00	18.30	10.92	0.00	19.14	15.03	0.00

Table A-10
Renovation 703 Units Unmitigated

7/16/2007 03:24:50 PM
Urbemis 2007 Version 9.2.0
Detail Report for Annual Construction Unmitigated Emissions (Tons/Year)
File Name: H:\AQ_\VAFB_MFH_WEST\URBEMIS RECALC\Renovation.urb9
Project Name: MFH Renovation
Project Location: Santa Barbara County APCD
On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006
Off-Road Vehicle Emissions Based on: OFFROAD2007
Construction Emission Estimates (Annual tons per year, unmitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
2010	1.01	4.36	19.75	0.01	0.08	0.16	0.23	0.03	0.14	0.17	1,616.65
Building 01/04/2010–08/29/2014	1.01	4.36	19.75	0.01	0.08	0.16	0.23	0.03	0.14	0.17	1,616.65
Building Off Road Diesel	0.09	0.51	0.30	0.00	0.00	0.03	0.03	0.00	0.03	0.03	50.63
Building Vendor Trips	0.18	2.52	1.90	0.00	0.02	0.09	0.10	0.01	0.08	0.09	442.45
Building Worker Trips	0.73	1.32	17.55	0.01	0.06	0.04	0.10	0.02	0.03	0.05	1,123.57
2011	5.91	3.98	18.43	0.01	0.08	0.15	0.22	0.03	0.13	0.16	1,621.28
Building 01/04/2010–08/29/2014	0.93	3.97	18.36	0.01	0.08	0.15	0.22	0.03	0.13	0.16	1,616.32
Building Off Road Diesel	0.09	0.48	0.29	0.00	0.00	0.03	0.03	0.00	0.03	0.03	50.63
Building Vendor Trips	0.17	2.27	1.77	0.00	0.02	0.08	0.10	0.01	0.07	0.08	442.47
Building Worker Trips	0.67	1.22	16.29	0.01	0.06	0.04	0.10	0.02	0.03	0.05	1,123.22
Coating 01/03/2011–08/29/2014	4.98	0.01	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.96
Architectural Coating	4.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.01	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.96
2012	5.86	3.62	17.16	0.01	0.08	0.14	0.21	0.03	0.12	0.15	1,627.29
Building 01/04/2010–08/29/2014	0.86	3.62	17.10	0.01	0.08	0.14	0.21	0.03	0.12	0.15	1,622.31
Building Off Road Diesel	0.08	0.46	0.28	0.00	0.00	0.03	0.03	0.00	0.03	0.03	50.83
Building Vendor Trips	0.16	2.03	1.66	0.00	0.02	0.07	0.09	0.01	0.06	0.07	444.19
Building Worker Trips	0.62	1.13	15.15	0.01	0.06	0.04	0.10	0.02	0.03	0.05	1,127.29
Coating 01/03/2011–08/29/2014	5.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.98
Architectural Coating	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.98

Table A-10 (continued)
Renovation 703 Units Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
2013	5.78	3.26	15.88	0.01	0.08	0.13	0.20	0.03	0.11	0.14	1,627.15
Building 01/04/2010–08/29/2014	0.78	3.26	15.82	0.01	0.08	0.13	0.20	0.03	0.11	0.14	1,622.17
Building Off Road Diesel	0.07	0.43	0.28	0.00	0.00	0.03	0.03	0.00	0.02	0.02	50.83
Building Vendor Trips	0.15	1.79	1.54	0.00	0.02	0.06	0.08	0.01	0.06	0.06	444.22
Building Worker Trips	0.56	1.04	14.01	0.01	0.06	0.04	0.10	0.02	0.03	0.05	1,127.12
Coating 01/03/2011–08/29/2014	5.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.98
Architectural Coating	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.98
2014	3.79	1.94	9.72	0.01	0.05	0.08	0.13	0.02	0.07	0.09	1,078.48
Building 01/04/2010–08/29/2014	0.47	1.94	9.68	0.01	0.05	0.08	0.13	0.02	0.07	0.09	1,075.18
Building Off Road Diesel	0.05	0.26	0.18	0.00	0.00	0.02	0.02	0.00	0.01	0.01	33.69
Building Vendor Trips	0.09	1.05	0.94	0.00	0.01	0.04	0.05	0.00	0.03	0.04	294.46
Building Worker Trips	0.34	0.63	8.56	0.01	0.04	0.02	0.06	0.01	0.02	0.03	747.03
Coating 01/03/2011–08/29/2014	3.32	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.30
Architectural Coating	3.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.30

Phase Assumptions

Phase: Building Construction 1/4/2010–8/29/2014 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 2 hours per day
1 Forklifts (145 hp) operating at a 0.3 load factor for 2 hours per day
1 Generator Sets (49 hp) operating at a 0.74 load factor for 2 hours per day
1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 2 hours per day
1 Welders (45 hp) operating at a 0.45 load factor for 2 hours per day

Phase: Architectural Coating 1/3/2011–8/29/2014 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Table A-10, Page 2 of 2

Table A-11
Renovation 703 Units Mitigated

7/16/2007 03:25:03 PM
Urbemis 2007 Version 9.2.0
Detail Report for Annual Construction Mitigated Emissions (Tons/Year)
File Name: H:\AQ_\VAFB_MFH_WEST\URBEMIS RECALC\Renovation.urb9
Project Name: MFH Renovation
Project Location: Santa Barbara County APCD
On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006
Off-Road Vehicle Emissions Based on: OFFROAD2007
Construction Emission Estimates (Annual tons per year, mitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
2010	1.01	4.21	19.75	0.01	0.08	0.13	0.20	0.03	0.11	0.14	1,616.65
Building 01/04/2010–08/29/2014	1.01	4.21	19.75	0.01	0.08	0.13	0.20	0.03	0.11	0.14	1,616.65
Building Off Road Diesel	0.09	0.37	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.63
Building Vendor Trips	0.18	2.52	1.90	0.00	0.02	0.09	0.10	0.01	0.08	0.09	442.45
Building Worker Trips	0.73	1.32	17.55	0.01	0.06	0.04	0.10	0.02	0.03	0.05	1,123.57
2011	2.15	3.85	18.43	0.01	0.08	0.12	0.20	0.03	0.10	0.13	1,621.28
Building 01/04/2010–08/29/2014	0.93	3.84	18.36	0.01	0.08	0.12	0.19	0.03	0.10	0.13	1,616.32
Building Off Road Diesel	0.09	0.35	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.63
Building Vendor Trips	0.17	2.27	1.77	0.00	0.02	0.08	0.10	0.01	0.07	0.08	442.47
Building Worker Trips	0.67	1.22	16.29	0.01	0.06	0.04	0.10	0.02	0.03	0.05	1,123.22
Coating 01/03/2011–08/29/2014	1.22	0.01	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.96
Architectural Coating	1.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.01	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.96
2012	2.09	3.50	17.16	0.01	0.08	0.11	0.19	0.03	0.10	0.12	1,627.29
Building 01/04/2010–08/29/2014	0.86	3.49	17.10	0.01	0.08	0.11	0.19	0.03	0.10	0.12	1,622.31
Building Off Road Diesel	0.08	0.33	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.83
Building Vendor Trips	0.16	2.03	1.66	0.00	0.02	0.07	0.09	0.01	0.06	0.07	444.19
Building Worker Trips	0.62	1.13	15.15	0.01	0.06	0.04	0.10	0.02	0.03	0.05	1,127.29
Coating 01/03/2011–08/29/2014	1.24	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.98
Architectural Coating	1.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.98

Table A-11 (continued)
Renovation 703 Units Mitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
2013	2.01	3.15	15.88	0.01	0.08	0.10	0.18	0.03	0.09	0.12	1,627.15
Building 01/04/2010–08/29/2014	0.78	3.14	15.82	0.01	0.08	0.10	0.18	0.03	0.09	0.12	1,622.17
Building Off Road Diesel	0.07	0.31	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.83
Building Vendor Trips	0.15	1.79	1.54	0.00	0.02	0.06	0.08	0.01	0.06	0.06	444.22
Building Worker Trips	0.56	1.04	14.01	0.01	0.06	0.04	0.10	0.02	0.03	0.05	1,127.12
Coating 01/03/2011–08/29/2014	1.23	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.98
Architectural Coating	1.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.98
2014	1.01	1.87	9.72	0.01	0.05	0.06	0.11	0.02	0.05	0.07	1,078.48
Building 01/04/2010–08/29/2014	0.47	1.87	9.68	0.01	0.05	0.06	0.11	0.02	0.05	0.07	1,075.18
Building Off Road Diesel	0.05	0.19	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.69
Building Vendor Trips	0.09	1.05	0.94	0.00	0.01	0.04	0.05	0.00	0.03	0.04	294.46
Building Worker Trips	0.34	0.63	8.56	0.01	0.04	0.02	0.06	0.01	0.02	0.03	747.03
Coating 01/03/2011–08/29/2014	0.54	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.30
Architectural Coating	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.30

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Building Construction 1/4/2010–8/29/2014 - Default Building Construction Description

For Cranes, the Use Aqueous Diesel Fuel mitigation reduces emissions by:
NOX: 15% PM10: 50% PM2.5: 50%

For Cranes, the Diesel Particulate Filter (DPF) 1st Tier mitigation reduces emissions by:
PM10: 85% PM2.5: 85%

For Cranes, the Diesel Oxidation Catalyst 15% mitigation reduces emissions by:
NOX: 15%

For Forklifts, the Use Aqueous Diesel Fuel mitigation reduces emissions by:
NOX: 15% PM10: 50% PM2.5: 50%

For Forklifts, the Diesel Particulate Filter (DPF) 1st Tier mitigation reduces emissions by:
PM10: 85% PM2.5: 85%

Table A-11 (continued)
Renovation 703 Units Mitigated

Construction Related Mitigation Measures, continued

For Forklifts, the Diesel Oxidation Catalyst 15% mitigation reduces emissions by:
NOX: 15%
For Generator Sets, the Use Aqueous Diesel Fuel mitigation reduces emissions by:
NOX: 15% PM10: 50% PM2.5: 50%
For Generator Sets, the Diesel Particulate Filter (DPF) 1st Tier mitigation reduces emissions by:
PM10: 85% PM2.5: 85%
For Generator Sets, the Diesel Oxidation Catalyst 15% mitigation reduces emissions by:
NOX: 15%
For Tractors/Loaders/Backhoes, the Use Aqueous Diesel Fuel mitigation reduces emissions by:
NOX: 15% PM10: 50% PM2.5: 50%
For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 1st Tier mitigation reduces emissions by:
PM10: 85% PM2.5: 85%
For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 15% mitigation reduces emissions by:
NOX: 15%
For Welders, the Use Aqueous Diesel Fuel mitigation reduces emissions by:
NOX: 15% PM10: 50% PM2.5: 50%
For Welders, the Diesel Particulate Filter (DPF) 1st Tier mitigation reduces emissions by:
PM10: 85% PM2.5: 85%
For Welders, the Diesel Oxidation Catalyst 15% mitigation reduces emissions by:
NOX: 15%
The following mitigation measures apply to Phase: Architectural Coating 1/3/2011–8/29/2014 -
Default Architectural Coating Description
For Residential Architectural Coating Measures, the Residential Exterior: Use Low VOC Coatings mitigation reduces emissions by:
ROG: 10%
For Residential Architectural Coating Measures, the Residential Interior: Use Low VOC Coatings mitigation reduces emissions by:
ROG: 10%
For Nonresidential Architectural Coating Measures, the Nonresidential Exterior: Use Low VOC Coatings mitigation reduces emissions by:
ROG: 10%
For Nonresidential Architectural Coating Measures, the Nonresidential Interior: Use Low VOC Coatings mitigation reduces emissions by:
ROG: 10%

Table A-11 (continued)
Renovation 703 Units Mitigated

Phase Assumptions

Phase: Building Construction 1/4/2010 - 8/29/2014–Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 2 hours per day
1 Forklifts (145 hp) operating at a 0.3 load factor for 2 hours per day
1 Generator Sets (49 hp) operating at a 0.74 load factor for 2 hours per day
1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 2 hours per day
1 Welders (45 hp) operating at a 0.45 load factor for 2 hours per day

Phase: Architectural Coating 1/3/2011–8/29/2014 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Table A-11, Page 4 of 4

Table A-12
Construction 164 Units Summary

7/16/2007 10:23:38 AM
Urbemis 2007 Version 9.2.0
Summary Report for Annual Emissions (Tons/Year)
File Name: H:\AQ_\VAFB_MFH_WEST\URBEMIS RECALC\Construction.urb9
Project Name: MFH Construction of 164 Units
Project Location: Santa Barbara County APCD
On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2012 TOTALS (tons/year unmitigated)	0.68	4.06	4.59	0.00	17.78	0.24	18.02	3.71	0.22	3.94	591.18
2012 TOTALS (tons/year mitigated)	0.68	3.59	4.59	0.00	4.04	0.12	4.16	0.85	0.11	0.96	591.18
Percent Reduction	0.00	11.62	0.00	0.00	77.28	48.43	76.89	77.24	48.58	75.63	0.00
2013 TOTALS (tons/year unmitigated)	2.99	2.61	5.05	0.00	0.02	0.15	0.17	0.01	0.14	0.14	596.89
2013 TOTALS (tons/year mitigated)	1.81	2.07	5.05	0.00	0.02	0.03	0.05	0.01	0.03	0.04	596.89
Percent Reduction	39.58	20.69	0.00	0.00	0.00	78.14	69.69	0.00	78.76	75.20	0.00
2014 TOTALS (tons/year unmitigated)	2.17	1.59	3.13	0.00	0.01	0.09	0.10	0.00	0.08	0.09	395.84
2014 TOTALS (tons/year mitigated)	1.04	1.26	3.13	0.00	0.01	0.02	0.03	0.00	0.02	0.02	395.84
Percent Reduction	51.86	20.90	0.00	0.00	0.00	77.57	68.28	0.00	78.27	74.32	0.00

Table A-13
Construction 164 Units Unmitigated

7/16/2007 03:11:58 PM
Urbemis 2007 Version 9.2.0
Detail Report for Annual Construction Unmitigated Emissions (Tons/Year)
File Name: H:\AQ_\VAFB_MFH_WEST\URBEMIS RECALC\Construction.urb9
Project Name: MFH
Project Location: Santa Barbara County APCD
On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006
Off-Road Vehicle Emissions Based on: OFFROAD2007
Construction Emission Estimates (Annual tons per year, unmitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
2012	0.68	4.06	4.59	0.00	17.78	0.24	18.02	3.71	0.22	3.94	591.18
Fine Grading 01/02/2012–06/29/2012	0.24	1.93	1.15	0.00	17.77	0.10	17.87	3.71	0.09	3.80	202.42
Fine Grading Dust	0.00	0.00	0.00	0.00	17.77	0.00	17.77	3.71	0.00	3.71	0.00
Fine Grading Off Road Diesel	0.24	1.92	1.06	0.00	0.00	0.10	0.10	0.00	0.09	0.09	195.49
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.00	0.01	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.93
Asphalt 04/02/2012–06/29/2012	0.08	0.51	0.34	0.00	0.00	0.04	0.04	0.00	0.04	0.04	44.82
Paving Off-Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.08	0.50	0.30	0.00	0.00	0.04	0.04	0.00	0.04	0.04	41.35
Paving On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Worker Trips	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.47
Building 06/04/2012–08/29/2014	0.35	1.62	3.10	0.00	0.01	0.10	0.11	0.00	0.09	0.09	343.94
Building Off Road Diesel	0.25	1.20	0.83	0.00	0.00	0.08	0.08	0.00	0.08	0.08	131.85
Building Vendor Trips	0.02	0.27	0.22	0.00	0.00	0.01	0.01	0.00	0.01	0.01	59.95
Building Worker Trips	0.08	0.15	2.05	0.00	0.01	0.00	0.01	0.00	0.00	0.01	152.15
2013	2.99	2.61	5.05	0.00	0.02	0.15	0.17	0.01	0.14	0.14	596.89
Building 06/04/2012–08/29/2014	0.55	2.60	5.02	0.00	0.02	0.15	0.17	0.01	0.14	0.14	594.47
Building Off Road Diesel	0.39	1.94	1.39	0.00	0.00	0.13	0.13	0.00	0.12	0.12	227.90
Building Vendor Trips	0.03	0.42	0.36	0.00	0.00	0.01	0.02	0.00	0.01	0.01	103.63
Building Worker Trips	0.13	0.24	3.27	0.00	0.01	0.01	0.02	0.01	0.01	0.01	262.94

Table A-13, Page 1 of 3

Table A-13 (continued)
Construction 164 Units Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Coating 01/07/2013–09/26/2014	2.44	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.43
Architectural Coating	2.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.43
2014	2.17	1.59	3.13	0.00	0.01	0.09	0.10	0.00	0.08	0.09	395.84
Building 06/04/2012–08/29/2014	0.34	1.59	3.11	0.00	0.01	0.09	0.10	0.00	0.08	0.08	394.02
Building Off Road Diesel	0.24	1.20	0.89	0.00	0.00	0.07	0.07	0.00	0.07	0.07	151.06
Building Vendor Trips	0.02	0.24	0.22	0.00	0.00	0.01	0.01	0.00	0.01	0.01	68.69
Building Worker Trips	0.08	0.15	2.00	0.00	0.01	0.01	0.02	0.00	0.00	0.01	174.27
Coating 01/07/2013–09/26/2014	1.83	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.82
Architectural Coating	1.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.82

Phase Assumptions

Phase: Fine Grading 1/2/2012–6/29/2012 - Default Fine Site Grading Description
Total Acres Disturbed: 54.67
Maximum Daily Acreage Disturbed: 13.67
Fugitive Dust Level of Detail: Default
20 lbs per acre-day
On Road Truck Travel (VMT): 0
Off-Road Equipment:
1 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day
1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day
2 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day
1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Paving 4/2/2012–6/29/2012 - Default Paving Description
Acres to be Paved: 0
Off-Road Equipment:
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day

Table A-13 (continued)
Construction 164 Units Unmitigated

Phase Assumptions, continued
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 6 hours per day
2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 6/4/2012–8/29/2014 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day
2 Forklifts (145 hp) operating at a 0.3 load factor for 7 hours per day
1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day
1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day
3 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 1/7/2013–9/26/2014 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

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Table A-14
Construction 164 Units Mitigated

7/16/2007 03:25:03 PM
Urbemis 2007 Version 9.2.0
Detail Report for Annual Construction Mitigated Emissions (Tons/Year)
File Name: H:\AQ_\VAFB_MFH_WEST\URBEMIS RECALC\Construction.urb9
Project Name: MFH Construction of 164 Units
Project Location: Santa Barbara County APCD
On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006
Off-Road Vehicle Emissions Based on: OFFROAD2007
Construction Emission Estimates (Annual tons per year, mitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
2012	0.68	3.59	4.59	0.00	4.04	0.12	4.16	0.85	0.11	0.96	591.18
Fine Grading 01/02/2012–06/29/2012	0.24	1.93	1.15	0.00	4.03	0.10	4.13	0.84	0.09	0.93	202.42
Fine Grading Dust	0.00	0.00	0.00	0.00	4.03	0.00	4.03	0.84	0.00	0.84	0.00
Fine Grading Off Road Diesel	0.24	1.92	1.06	0.00	0.00	0.10	0.10	0.00	0.09	0.09	195.49
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.00	0.01	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.93
Asphalt 04/02/2012–06/29/2012	0.08	0.37	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.82
Paving Off-Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.08	0.36	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.35
Paving On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Worker Trips	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.47
Building 06/04/2012–08/29/2014	0.35	1.29	3.10	0.00	0.01	0.02	0.03	0.00	0.02	0.02	343.94
Building Off Road Diesel	0.25	0.87	0.83	0.00	0.00	0.01	0.01	0.00	0.01	0.01	131.85
Building Vendor Trips	0.02	0.27	0.22	0.00	0.00	0.01	0.01	0.00	0.01	0.01	59.95
Building Worker Trips	0.08	0.15	2.05	0.00	0.01	0.00	0.01	0.00	0.00	0.01	152.15
2013	1.81	2.07	5.05	0.00	0.02	0.03	0.05	0.01	0.03	0.04	596.89
Building 06/04/2012–08/29/2014	0.55	2.06	5.02	0.00	0.02	0.03	0.05	0.01	0.03	0.04	594.47
Building Off Road Diesel	0.39	1.40	1.39	0.00	0.00	0.01	0.01	0.00	0.01	0.01	227.90
Building Vendor Trips	0.03	0.42	0.36	0.00	0.00	0.01	0.02	0.00	0.01	0.01	103.63
Building Worker Trips	0.13	0.24	3.27	0.00	0.01	0.01	0.02	0.01	0.01	0.01	262.94

Table A-14, Page 1 of 5

Table A-14 (continued)
Construction 164 Units Mitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Coating 01/07/2013–09/26/2014	1.25	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.43
Architectural Coating	1.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.43
2014	1.04	1.26	3.13	0.00	0.01	0.02	0.03	0.00	0.02	0.02	395.84
Building 06/04/2012–08/29/2014	0.34	1.26	3.11	0.00	0.01	0.02	0.03	0.00	0.02	0.02	394.02
Building Off Road Diesel	0.24	0.87	0.89	0.00	0.00	0.01	0.01	0.00	0.01	0.01	151.06
Building Vendor Trips	0.02	0.24	0.22	0.00	0.00	0.01	0.01	0.00	0.01	0.01	68.69
Building Worker Trips	0.08	0.15	2.00	0.00	0.01	0.01	0.02	0.00	0.00	0.01	174.27
Coating 01/07/2013-09/26/2014	0.71	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.82
Architectural Coating	0.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.82

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Fine Grading 1/2/2012–6/29/2012 - Default Fine Site Grading Description

For Soil Stabilizing Measures, the Apply soil stabilizers to inactive areas mitigation reduces emissions by:
PM10: 84% PM2.5: 84%

For Soil Stabilizing Measures, the Replace ground cover in disturbed areas quickly mitigation reduces emissions by:
PM10: 5% PM2.5: 5%

For Soil Stabilizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:
PM10: 55% PM2.5: 55%

For Soil Stabilizing Measures, the Equipment loading/unloading mitigation reduces emissions by:
PM10: 69% PM2.5: 69%

The following mitigation measures apply to Phase: Paving 4/2/2012–6/29/2012 - Default Paving Description

For Pavers, the Use Aqueous Diesel Fuel mitigation reduces emissions by:
NOX: 15% PM10: 50% PM2.5: 50%

For Pavers, the Diesel Particulate Filter (DPF) 1st Tier mitigation reduces emissions by:
PM10: 85% PM2.5: 85%

For Pavers, the Diesel Oxidation Catalyst 15% mitigation reduces emissions by:
NOX: 15%

Table A-14 (continued)
Construction 164 Units Mitigated

Construction Related Mitigation Measures, continued

For Paving Equipment, the Use Aqueous Diesel Fuel mitigation reduces emissions by:
NOX: 15% PM10: 50% PM2.5: 50%
For Paving Equipment, the Diesel Particulate Filter (DPF) 1st Tier mitigation reduces emissions by:
PM10: 85% PM2.5: 85%
For Paving Equipment, the Diesel Oxidation Catalyst 15% mitigation reduces emissions by:
NOX: 15%
For Rollers, the Use Aqueous Diesel Fuel mitigation reduces emissions by:
NOX: 15% PM10: 50% PM2.5: 50%
For Rollers, the Diesel Particulate Filter (DPF) 1st Tier mitigation reduces emissions by:
PM10: 85% PM2.5: 85%
For Rollers, the Diesel Oxidation Catalyst 15% mitigation reduces emissions by:
NOX: 15%
The following mitigation measures apply to Phase: Building Construction 6/4/2012–8/29/2014 - Default Building Construction Description
For Cranes, the Use Aqueous Diesel Fuel mitigation reduces emissions by:
NOX: 15% PM10: 50% PM2.5: 50%
For Cranes, the Diesel Particulate Filter (DPF) 1st Tier mitigation reduces emissions by:
PM10: 85% PM2.5: 85%
For Cranes, the Diesel Oxidation Catalyst 15% mitigation reduces emissions by:
NOX: 15%
For Forklifts, the Use Aqueous Diesel Fuel mitigation reduces emissions by:
NOX: 15% PM10: 50% PM2.5: 50%
For Forklifts, the Diesel Particulate Filter (DPF) 1st Tier mitigation reduces emissions by:
PM10: 85% PM2.5: 85%
For Forklifts, the Diesel Oxidation Catalyst 15% mitigation reduces emissions by:
NOX: 15%
For Generator Sets, the Use Aqueous Diesel Fuel mitigation reduces emissions by:
NOX: 15% PM10: 50% PM2.5: 50%
For Generator Sets, the Diesel Particulate Filter (DPF) 1st Tier mitigation reduces emissions by:
PM10: 85% PM2.5: 85%
For Generator Sets, the Diesel Oxidation Catalyst 15% mitigation reduces emissions by:
NOX: 15%

Table A-14 (continued)
Construction 164 Units Mitigated

Construction Related Mitigation Measures, continued

For Tractors/Loaders/Backhoes, the Use Aqueous Diesel Fuel mitigation reduces emissions by:
NOX: 15% PM10: 50% PM2.5: 50%
For Tractors/Loaders/Backhoes, the Diesel Particulate Filter (DPF) 1st Tier mitigation reduces emissions by:
PM10: 85% PM2.5: 85%
For Tractors/Loaders/Backhoes, the Diesel Oxidation Catalyst 15% mitigation reduces emissions by:
NOX: 15%
For Welders, the Use Aqueous Diesel Fuel mitigation reduces emissions by:
NOX: 15% PM10: 50% PM2.5: 50%
For Welders, the Diesel Particulate Filter (DPF) 1st Tier mitigation reduces emissions by:
PM10: 85% PM2.5: 85%
For Welders, the Diesel Oxidation Catalyst 15% mitigation reduces emissions by:
NOX: 15%
The following mitigation measures apply to Phase: Architectural Coating 1/7/2013–9/26/2014 - Default Architectural Coating Description
For Residential Architectural Coating Measures, the Residential Exterior: Use Low VOC Coatings mitigation reduces emissions by:
ROG: 10%
For Residential Architectural Coating Measures, the Residential Interior: Use Low VOC Coatings mitigation reduces emissions by:
ROG: 10%
For Nonresidential Architectural Coating Measures, the Nonresidential Exterior: Use Low VOC Coatings mitigation reduces emissions by:
ROG: 10%
For Nonresidential Architectural Coating Measures, the Nonresidential Interior: Use Low VOC Coatings mitigation reduces emissions by:
ROG: 10%

Phase Assumptions

Phase: Fine Grading 1/2/2012–6/29/2012 - Default Fine Site Grading Description
Total Acres Disturbed: 54.67
Maximum Daily Acreage Disturbed: 13.67
Fugitive Dust Level of Detail: Default
20 lbs per acre-day
On Road Truck Travel (VMT): 0
Off-Road Equipment:
1 Graders (174 hp) operating at a 0.61 load factor for 8 hours per day
1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day

Table A-14 (continued)
Construction 164 Units Mitigated

Phase Assumptions

2 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day
1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Paving 4/2/2012–6/29/2012 - Default Paving Description
Acres to be Paved: 0
Off-Road Equipment:
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day
2 Paving Equipment (104 hp) operating at a 0.53 load factor for 6 hours per day
2 Rollers (95 hp) operating at a 0.56 load factor for 6 hours per day

Phase: Building Construction 6/4/2012–8/29/2014 - Default Building Construction Description
Off-Road Equipment:
1 Cranes (399 hp) operating at a 0.43 load factor for 7 hours per day
2 Forklifts (145 hp) operating at a 0.3 load factor for 7 hours per day
1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day
1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day
3 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 1/7/2013–9/26/2014 - Default Architectural Coating Description
Rule: Residential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Residential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250
Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Table A-14, Page 5 of 5

APPENDIX B: CULTURAL RESOURCES REPORT

ENVIRONMENTAL ASSESSMENT OF CULTURAL RESOURCES FOR MILITARY FAMILY HOUSING PRIVATIZATION VANDENBERG AIR FORCE BASE SANTA BARBARA COUNTY, CALIFORNIA

Clayton G. Lebow, Leeann Haslouer, and Robert Peterson, Jr.

This document is a contribution to the environmental assessment for the privatization of the military family housing (MFH) on Vandenberg Air Force Base (AFB). This document begins with a discussion of the affected environment by presenting a synopsis of the region's prehistory, ethnohistory, and history. It then examines the existing cultural resources within and near the project area. It concludes with an examination of the consequences to cultural resources if the proposed action moves forward.

1.0 CULTURAL SETTING

The following summary of prehistory and ethnohistory is modified from Lebow and Moratto (2005). The historical overview derives primarily from Palmer (1999).

1.1 Prehistory

The prehistory of California's central coast spans the entire Holocene and may extend back to late Pleistocene times. In the Santa Barbara Channel region, a fluted Clovis point found on the surface of a coastal site suggests use of the area possibly as early as 11,000–12,000 years ago (Erlandson et al. 1987), while a site on San Miguel Island has yielded a radiocarbon date of 10,300 B.P. (Erlandson 1991). Recent calibrations suggest that terminal Pleistocene radiocarbon dates are about 2,000 years too recent (Fiedel 1999:95) and thus these early sites may be even older. In San Luis Obispo County, excavations at CA-SLO-2 in Diablo Canyon revealed an occupation older than 9,000 years (Greenwood 1972; Moratto 1984) and investigations at CA-SLO-1797 indicate initial occupations as early as 10,300 B.P. (Fitzgerald 1998). Occupations on Vandenberg AFB occurred by at least 9,000 years ago, based on radiocarbon dates from CA-SBA-931 (Glassow 1990, 1996) and CA-SBA-246 (Lebow et al. 2001) near the mouth of the Santa Ynez River, and from CA-SBA-530 at the mouth of Honda Canyon (Lebow et al. 2002).

Moratto (1984) refers to these early occupations as Paleocoastal. Population densities were probably low, judging from the limited number of sites dated to this period. Diagnostic tools associated with this time period have not been identified, although similarities with the San Dieguito Complex in southern California (Wallace 1978; Warren 1967) have been suggested (Erlandson 1994). Cultural assemblages have few of the grinding implements common to subsequent periods. These sites are characterized by a strong maritime orientation and an apparent reliance on shellfish. Occupants are thought to have lived in small groups that had a relatively egalitarian social organization and a forager-type land-use strategy (Erlandson 1994; Glassow 1996; Greenwood 1972; Moratto 1984).

Site densities throughout the central coast are higher during the subsequent periods, suggesting increased population size and possibly better site preservation. Sites dating between about 8,000 and 6,500 years

ago often have relatively high densities of manos and milling slabs that are typically associated with processing seeds. These milling stones are diagnostic of this period. Shellfish appear to have continued as a dietary staple throughout the central coast (Erlandson 1994; Glassow and Wilcoxon 1988), including Vandenberg AFB (Glassow 1996; Woodman et al. 1995). However, terrestrial mammals composed a larger portion of the diet on Vandenberg AFB during this period than during any other time (Glassow 1996; Rudolph 1991). Fish were a larger part of the diet than shellfish at Morro Bay in San Luis Obispo County, although shellfish were better represented during this period than during subsequent periods (Jones et al. 1994).

Early scholars associated sites of this age with inland knolls and terraces (e.g., Rogers 1929), but subsequent investigations revealed that coastal environments were also used (e.g., Glassow et al. 1988). Well-developed middens at many sites suggest a more sedentary and stable settlement system (Breschini et al. 1983). Glassow (1990, 1996) infers that occupants of Vandenberg AFB during this time were sedentary and had begun using a collector-type (i.e., logistically mobile) land-use strategy. Burial practices suggest that society was primarily egalitarian (Glassow 1996).

Population densities appear to have decreased substantially between 6500 and 5000 B.P. throughout the region, and little is known about this period. It is possible that arid conditions associated with the Altithermal degraded the environment to the point that only low population densities were possible (Glassow 1996; Glassow and Wilcoxon 1988).

After 5000 B.P., population densities increased to pre-6500 B.P. levels as conditions became cooler and more moist. Between 5000 and 3000 B.P., mortars and pestles became increasingly common throughout the region, suggesting intensified use of acorns (Basgall 1987), although these implements may have been associated with processing pulpy roots or tubers (Glassow 1997). Along the Santa Barbara Channel coastline, use of shellfish declined as other animal foods became more important. Use of more diverse environmental settings is suggested (Erlandson 1997). On Vandenberg AFB, fish and sea mammals composed a larger part of the diet during this period. Large side-notched and stemmed projectile points became more prevalent in the archaeological record, presumably reflecting increased hunting, although Glassow (1996) suggests that proportions of terrestrial mammals do not surpass the pre-6500 B.P. levels. However, higher proportions of terrestrial mammals in archaeological assemblages are associated with this period in San Luis Obispo County. Increased logistical organization is suggested in this area (Jones et al. 1994; Jones and Waugh 1995). Proportions of obsidian (indicating exchange with other regions) increased after about 5000 B.P., particularly in San Luis Obispo County (Jones et al. 1994; Jones and Waugh 1995).

Confidence in the reconstructions of early human occupation on the Central California Coast needs to be tempered to some degree by the consideration of changes in coastline configuration over this period. Various studies (Inman 1983; Kinlan et al. 2005; Porcasi et al. 1999) suggest that sea levels were rising at a fluctuating rate during the Early Holocene from a low stand at the height of the last glaciation around 15,000–23,000 years ago. This, combined with the variations in offshore bathymetry, means that at different points in time the coastline was varying distances from where it is today. Morgan et al. (1991) note that due to the shallow sloping sea floor at the mouth of the Santa Ynez River the shoreline was probably some 5.5 kilometers west of its present position around 10,000 years ago. Off the more steeply sloping shore at the mouth of Honda Canyon, however, the distance was more like 2 kilometers around the same time (Lebow et al. 2002:3-30). This realization has significant archaeological implications. One is that a whole range of archaeological evidence dating to the Early Holocene is offshore, where it is not available for study. Another realization is that sites that are today in nearshore environments were not as close to the coastline some 4,000–10,000 years ago. The shoreline in this part of the California coast appears to have reached essentially its present configuration about 3,000–4,000 years ago.

Cultural complexity appears to have increased around 3,000–2,500 B.P. Based on mortuary data from the Santa Barbara area, King (1981, 1990) suggests a substantial change in social organization and political complexity about 3,000 years ago. According to King, high-status positions became hereditary and individuals began to accumulate wealth and control exchange systems. Arnold (1991, 1992) proposes that this evolutionary step in socioeconomic complexity occurred around 700–800 years ago. In their studies on Vandenberg AFB, Lebow et al. (2006) found changes in the archaeological data supporting King's (1981, 1990) chronology of culture change.

The period between 2,500 and 800 years ago is marked by increased cultural complexity and technological innovation. Fishing and sea mammal hunting became increasingly important, corresponding to development of the *tomol* (a plank canoe), single-piece shell fishhooks, and harpoons (Glassow 1996; King 1990). The bow and arrow also was introduced during this period (Glenn 1990, 1991). Sites in San Luis Obispo County suggest that use of terrestrial mammals remained high. Proportions of imported obsidian continued to increase during this period (Jones et al. 1994).

Arnold (1992) proposes that the complex Chumash sociopolitical system known at historic contact evolved substantially during a brief period between A.D. 1150 and 1300, which she terms the Middle/Late Transitional Period. Arnold infers that decreased marine productivity caused by elevated sea-surface temperatures resulted in subsistence stress that allowed an elite population to control critical resources, labor, and key technologies, resulting in hierarchical social organization and a monetary system. Although the issue of elevated sea-surface temperatures has been questioned (e.g., Kennett 1998) and the inference of marine degradation and subsistence stress has been challenged (e.g., Raab et al. 1995; Raab and Larson 1997), the full emergence of Chumash cultural complexity around this time is generally accepted.

On Vandenberg AFB and in the Santa Barbara Channel region, population densities reached peak levels between 700 years ago and historic contact (Glassow 1990, 1996). Higher numbers of *Olivella* shell beads reflect increased exchange between the Channel Islands, the Santa Barbara mainland, and Vandenberg AFB. Increased subsistence diversity is apparent. Although shellfish continued to be a dietary staple in the Vandenberg area, the use of fish and birds increased, proportions of secondary species in shellfish assemblages increased (Glassow 1990), and dietary expansion is evident (Lebow and Harro 1998). Correspondingly, the range and diversity of site types increased as a greater range of habitats and resources was used (Glassow 1990; Lebow and Harro 1998; Woodman et al. 1991). In San Luis Obispo County, the settlement system appears to have changed substantially after 700 B.P. as residential bases along the coast were abandoned in favor of habitation sites farther inland. Coastal sites were used to obtain resources during short-term occupations (Breschini and Haversat 1988; Greenwood 1972; Jones et al. 1994; Jones and Waugh 1995). In addition, proportions of imported obsidian decreased substantially during this period (Jones et al. 1994).

1.2 Ethnohistory

People living in the Vandenberg AFB area prior to historic contact are grouped with the Purisimeño Chumash (Greenwood 1978; King 1984; Landberg 1965), one of several linguistically related members of the Chumash culture. Their social organization, traditions, cosmology, and material culture are described by Blackburn (1975), Grant (1978a, 1978b, 1978c, 1978d), Greenwood (1978), Hudson et al. (1977), Hudson and Blackburn (1982, 1985, 1986), Hudson and Underhay (1978), Johnson (1988), and Landberg (1965).

Accounts of early explorers in the Santa Barbara Channel area indicate that the Chumash people lived in large, densely populated villages with well-built structures (e.g., Bolton 1926, 1931; Engelhardt 1933; Fages 1937; Moriarity and Keistman 1968; Simpson 1939; Teggart 1911; Wagner 1929). With a total

Chumash-speaking population estimated at 18,500 (Cook 1976) and employing a maritime economy, the Chumash had a culture that "was as elaborate as that of any hunter-gatherer society on earth" (Moratto 1984:118). Leadership was hereditary and chiefs exercised control over more than one village, reflecting a simple chiefdom social organization. The Chumash engaged in craft specialization and maintained exchange systems (Arnold 1992; Johnson 1988).

Relatively little is known about the Chumash in the Vandenberg region. Explorers noted that villages were smaller and lacked the formal structure found in the channel area (Greenwood 1978:520). Approximately 22 villages were used by the Purisimeño Chumash at historic contact, with populations between 30 and 200 per village (Glassow 1996:13–14). About five ethnohistoric villages are identified by King (1984:Figure 1) on Vandenberg AFB, along with another five villages in the general vicinity.

Unfortunately, early explorers paid scant attention to Chumash subsistence and settlements systems. Using ethnohistoric, ethnographic, and archaeological data, Landberg (1965) attempted to reconstruct those facets of Chumash lifeways. Chumash subsistence relied primarily on fishing, hunting, and gathering plants (primarily acorns). In the spring, groups left their winter villages for temporary camps where they gathered grasses, roots, tubers, and bulbs. Hunting marine mammals became important during times when seals and sea lions congregated at their rookeries. Bulbs, roots, and tubers also were gathered during the summer months as well, and seeds became important during this season, especially to the people north of Point Concepción. Interior groups moved to the coast during the spring and summer to collect shellfish. Coastal groups returned to their villages in late summer and early fall to harvest large schooling fish such as tuna. Pine nuts were collected in the mountains during the fall months; acorns also were gathered in the late fall. Both of these resources, as well as berries collected during the late summer and early fall, were stored for use during the winter. Hunting also was important during the fall. Winter months were spent in villages, where residents relied primarily on stored foodstuffs as well as occasional fresh fish (Landberg 1965:102–104). Regional variation in subsistence strategies is evident in the ethnohistoric record (Landberg 1965:104–118); in the interior and along the northern coast of Chumash territory, marine resources were less important than acorns, seeds, and game (particularly deer). Contact with early Euroamerican explorers, beginning with the maritime voyages of Cabrillo in A.D. 1542–1543, undoubtedly had an effect on the Chumash culture. The effect may have been profound. Erlandson and Bartoy (1995, 1996) and Preston (1996) convincingly argue that Old World diseases substantially impacted Chumash populations more than 200 years before Spanish occupation began in the 1770s.

Unquestionably, drastic changes to Chumash lifeways resulted from the Spanish occupation that began with the Portolá expedition in A.D. 1769. The first mission in Chumash territory was established in San Luis Obispo in 1772, followed in short order by San Buenaventura (1782), Santa Barbara (1786), and La Purísima Concepción, established in 1787 in the present location of Lompoc. The Santa Ynez Mission was established in 1804. Eventually, nearly the entire Chumash population was under the mission system (Grant 1978a). During the 1830s, the missions were secularized in an attempt to turn the mission centers into pueblos and make the Indians into Mexican citizens.

1.3 History

Vandenberg AFB history is divided into the Mission, Rancho, Anglo-Mexican, Americanization, Regional Culture, and Suburban periods (Palmer 1999). The Mission Period began with the early Spanish explorers and continued until 1820. Poor sailing conditions along California's coastline prompted the Spanish to find overland routes for colonization. In August and September of 1769, Captain Gaspar de Portola led an expedition that crossed through the Vandenberg AFB area on its way to establish a mission at Monterey. A diary of the expedition was kept by Fray Juan Crespi. Reconstruction of the expedition route suggests that they camped at several locations in the Vandenberg region, including Jalama Beach,

the ethnohistoric Chumash village of *Nocto* near Point Pedernales, the mouth of the Santa Ynez River, and a temporary Chumash encampment adjacent to a large pond just north of San Antonio Creek (Bradley 1994:16); Roberts 1984:11-2--11-3).

In 1776, Juan Bautista de Anza led an expedition of settlers to establish San Francisco, following the route used by Portola through the Vandenberg AFB region. Fray Pedro Font kept a detailed diary of the journey (Bolton 1930), indicating that the expedition camped near Jalama Beach on February 27, and near the mouth of the Santa Ynez River the next day. On February 29 they crossed the river and traveled northeast for four leagues (approximately 10 miles), camping at the same pond where Portola camped (Bradley 1994:17; Roberts 1984:11-5).

The Mission Period continued until 1820. Established in 1787, Mission La Purísima encompassed the area between Gaviota and Guadalupe. Farming and ranching were the primary economic activities at the Mission, which was responsible for supplying the Santa Barbara Presidio with food supplies. The Mission had 4,000 head of sheep by 1800; by 1812 they numbered 12,000. The number of cattle peaked at 23,456 in 1821. Missionaries had the Chumash weave wool blankets for the Santa Barbara Presidio. Approximately 14,000 head of livestock remained when the Mission closed in 1835. In addition to livestock, crops such as wheat, barley, corn, peas, and beans were grown at Mission La Purísima. Agricultural activities primarily occurred along the major streams such as San Antonio Creek and the Santa Ynez River (Palmer 1999:1–7).

The Rancho Period of Vandenberg AFB history began in 1820 and continued until 1845 (Palmer 1999). Following secularization in 1834, the Alta California government granted former mission lands to Mexican citizens as ranchos. The military family housing on Vandenberg AFB lies within Rancho Jesus Maria, which originally encompassed 42,184 acres and was granted to Lucas, Antonio, and Jose Olivera in 1837. Rancho Jesus Maria included lands from just south of Shuman Canyon (northern boundary) to the Santa Ynez River (southern boundary), and from the Pacific Ocean to a few kilometers east of San Antonio Terrace and Burton Mesa on the east (Tetra Tech 1988). Lucas Olivera is thought to have constructed an adobe at the site of the Marshallia Ranch in 1837; this site is about 4.1 kilometers (2.5 miles) northeast of the current military family housing. By 1839, Antonio and Jose Olivera had sold their part of the land grant to José Valenzuela, who, in 1847, sold a one-third share to Don Pedro Carrillo and a one-third share to Lewis T. Burton. Cattle ranching was the primary economic activity during the Rancho Period; in the 1840s cattle were so abundant that only the hides had any value (Palmer 1999).

The Bear Flag Revolt and the Mexican War marked the beginning of the Anglo-Mexican Period (1845–1880). Cattle ranching continued to flourish during the early part of this period, with as many as 500,000 cattle in Santa Barbara County during the 1850s. However, severe droughts during the 1860s decimated cattle herds and less than 5,000 cattle remained in the entire county. The combination of drought and change in government from Mexico to the United States caused substantial changes in land ownership. By 1851, approximately 42 percent of the land grants were owned by non-Mexicans; by 1864, after a few years of drought, 90 percent of the southern California ranchos were mortgaged. The various shares in Rancho Jesus Maria changed hands, with Lewis Burton increasing his holdings. His son, Ben Burton, inherited all of Rancho Jesus Maria upon his father's death in 1879. Sheep ranching and grain farming replaced the old rancho system during this period. Dairy farming became an important economic activity during this time, particularly as Swiss-Italians immigrated into the area. Early roads were established during the 1860s and 1870s to obtain supplies that were surfed in at Point Sal. Farming remained a limited activity, due in part to the difficulty of shipping to markets. Lompoc was established during this period by the Lompoc Temperance Colony (Palmer 1999).

Increased population densities characterize the Americanization Period (1880–1915). The railroad reached the area in the late 1890s and provided a more efficient means of shipping and receiving goods

and supplies, which in turn increased economic activity. Ranching continued and agriculture increased, particularly with development of steam-powered threshers. Row crops became increasingly common, and sugar beets were one of the most economically important commodities. Union Sugar Company had a substantial influence on economic growth in the region. Oil exploration began in earnest during this period. Union Oil began to purchase Rancho Jesus Maria property in 1903; they ultimately obtained subsurface rights to 120,000 acres in the area. Ben Burton leased the former Rancho Jesus Maria for grazing and farming during the early part of the Americanization Period. However, by 1900 the rancho was divided into four parcels and sold. These four parcels were further subdivided by 1906. Edwin Marshall formed the Jesus Maria Rancho Corporation in December of 1906; by the 1920s the Marshall Ranch encompassed 52,000 acres and prospered by raising cattle and beets. Its headquarters were constructed between 1906 and 1933 at the location of the Olivera adobe. An elaborate system of line camps and other facilities supported the ranch operations. Marshall also introduced eucalyptus trees as a potential source of commercial firewood.

Ranching and farming continued on the Marshall Ranch during the early part of The Period of Regional Culture (1915–1945). At various times, the Marshall Ranch experimented with game birds, chickens, turkeys, and purebred bulls. Grain was raised on coastal terraces, and Union Sugar purchased farm land in the San Antonio Valley from Marshall for agricultural purposes. In 1933, the Marshall family moved to the Olivera adobe and expanded and modernized the building. A wood-framed guest house was added in 1935, and a dude ranch operation began. The facility became known as the Marshallia Ranch and catered to Hollywood personalities. Visitors could arrive by airplane at an air strip in front of the house, and they could enjoy ranching activities, horseback riding, or tennis. The ranch was sold to Frank Long upon the death of Edwin Marshall in 1937. Cattle ranching and guest operations continued until the start of World War II, when the property was condemned for Camp Cooke. However, the Army allowed the Marshallia Ranch to stay open to serve Army officers. All ranching, farming, and dairy farming in the Vandenberg AFB area was substantially reduced when Camp Cooke was established in 1941. This Army training facility was built on approximately 90,000 acres along the coast, and included the area of Rancho Jesus Maria. Camp Cooke was deactivated at the end of World War II (Palmer 1999).

The Suburban Period (1945–1965) began with the end of World War II. After Camp Cooke was deactivated, the Army continued the historic tradition and leased much of the area for ranching and farming. Oil drilling reached its peak during this period. Union Oil drilled a number of wells on the San Antonio Terrace, and the Jesus Maria No. 4 produced commercial quantities of oil. Most of the Suburban Period is characterized by military use of the area. Camp Cooke was reactivated in 1950 for training during the Korean War. It was put into caretaker status from 1953 to 1956. The cantonment area became so overgrown that sheep were used to manage the vegetation and reduce the fire hazard. In November of 1956, the Army transferred 64,000 acres of North Camp Cooke to the Air Force, and it was renamed the Cooke Air Force Base (Palmer 1999). In 1958 the base had its first missile launch, the Thor, and was renamed Vandenberg AFB. The southern section of the current base was transferred to the Air Force from Army and Navy control in 1964 (Vandenberg AFB 1992). Post-transfer use of both North and South Base has related primarily to the construction and operation of missile launch and support facilities. Specific activities include management of the launch, testing, and evaluation of ballistic missile and space systems for the DOD, and operation of the Western Range (Science Applications International Corporation [SAIC] 1995a; Vandenberg AFB 1992).

2.0 EXISTING RESOURCES

Currently, military family housing on Vandenberg AFB is located in two areas. On the main base west of Highway 1, housing includes 1,336 units on 508 acres in an area referred to as West Housing. Another 633 dwellings on 220 acres are east of Highway 1, an area referred to as East Housing. Privatization of military family housing is restricted to West Housing.

An archaeological site record and literature search was completed at the 30 CES/CEVNC at Vandenberg AFB and at the Central Coast Information Center, University of California Santa Barbara (UCSB). Background research included a review of archaeological literature, archaeological base maps, and cultural resource records. Previous archaeological studies within 1.0 mile of West Housing (Table 1, see below) and archaeological resources within 0.25 mile of the project area (Table 2, see below) were identified during the record search. For cultural resource studies, a 60-meter-wide buffer was established around the existing housing complex in case access roads or infrastructure such as utilities are necessary. More extensive information was collected for sites and isolated artifacts within the project area and 60 meter buffer.

Maps examined at 30 CES/CEVNC included the Vandenberg AFB C-1 series (46 map set), the Base Comprehensive Plan geographic information system (GIS), and USGS topographic maps. Electronic GIS layers examined include ARCHSITE2000, ISOLATE2000, CULPOLY, CULPTS, CULROADS, AND CULSTORM.

In the mid-1990s, the Tri-Services Cultural Resources Research Center at the United States Army Construction Engineering Research Laboratory (USACERL) completed a three-phase inventory and evaluation of Cold War properties on Vandenberg AFB to assist the installation in its effort to comply with Section 106 of the National Historic Preservation Act (McCullough and Nowlan 1997; Nowlan *et al.* 1996; Nowlan and McCullough 1997). The USACERL documents were consulted during the background research. Family housing units were evaluated in Appendix A of the first USACERL volume. Military family houses on Vandenberg AFB were constructed after 1958 and thus do not meet the 50-year criteria for significance and, because the Cold War criteria for listing historic properties is focused on front-line weapons systems and support facilities, do not meet the criteria for early listing on the National Register of Historic Places (NRHP). In the housing privatization Section 106 consultation, the California State Historic Preservation Officer (SHPO) agreed that the Capehart houses on Vandenberg AFB are not eligible for inclusion on the NRHP. Since the USACERL evaluation, many of the Capehart houses have been demolished and replaced with more modern units.

2.1 Cultural Resource Studies within and adjacent to the MFH Privatization Project

Background research revealed that 34 cultural resource studies have been completed within 1 mile of the MFH Privatization Project area (Table 1, see below). Eight of those studies are within or adjacent to the project area and are summarized below. Five of the studies completed within or adjacent to the project area were done specifically for housing replacement projects. While a number of archaeological surveys have been completed within and adjacent to the Vandenberg AFB housing complexes, only five meet the current standards set forth in Volumes 5 and 6 of the Base's draft *Integrated Cultural Resource Management Plan* (ICRMP). Among these is a recently completed survey of the cantonment area that encompassed the entire MFH Privatization Project.

In the early 1980s, an archaeological survey of seismic corridors was completed for the Union Oil Company of California (WESTEC Services, Inc. 1981). Thirty seismic lines were examined, including two lines within the military family housing. Each survey corridor was 50 feet wide. No archaeological resources were found within or near the military family housing.

A cable replacement project included an archaeological survey just north of the West Housing (Greenwood and Foster 1984). A corridor 100 feet wide was examined. Two sites were discovered near the military family housing. Their precise locations are unclear but in the Base GIS CA-SBA-1868 is about 80 meters from the edge of the housing complex and thus is outside the 60-meter buffer for the MFH Privatization Project, while CA-SBA-1869 is within the 60 meter buffer. About 20 artifacts were

observed in a 50 meter diameter area at CA-SBA-1869 and a single shovel test pit excavated in the site yielded 10 artifacts. Based on this limited evidence, Greenwood and Foster (1984:44) indicated that the site lacked sufficient constituent density and diversity as well as chronological indicators. Consequently, they opined that the site was not eligible for the NRHP.

Gibson (1986) monitored installation of the replacement cable surveyed by Greenwood and Foster (1984) and found that CA-SBA-1869 was larger than initially indicated and covered an area measuring approximately 120 by 80 meters. Contrary to the site's plotted location in the Base GIS, Gibson (1986) indicates that CA-SBA-1869 is more than 120 meters from the military family housing and that CA-SBA-1868 is more than 220 meters away. Also contrary to Greenwood and Foster (1984), Gibson argued that the site could yield information important to understanding local and regional prehistory and therefore was eligible for the NRHP. CA-SBA-1869 was investigated further during a study for military family housing (Price et al. 1969) and is discussed in greater detail below.

In 1993, Science Applications International Corporation (SAIC 1994a) completed an archaeological survey of a proposed recreational trail as part of an improvement to the Capehart Military Family Housing. A single isolated artifact (a chert flake) was identified in a landscaped and clearly disturbed area. Due to the disturbed context, the isolated artifact was not considered significant. No other archaeological resources were discovered.

Archaeological studies for replacement of existing military family housing began in the mid 1990s (Price et al. 1996). The initial work included archival research focused on a World War II prisoner of war camp and cemetery. An archaeological survey of 93 acres in small, non-contiguous blocks in and near both East and West Housing identified one previously recorded prehistoric site, four previously-unknown prehistoric isolated artifacts, and one historical feature within the survey area. No artifacts or features associated with the World War II prisoner of war camp or cemetery were found during the survey and archival research indicated that all remains in the cemetery were exhumed in 1947 and moved to San Bruno, California.

As part of their study for housing replacement, Price et al. (1996) completed subsurface testing at archaeological site CA-SBA-1869 (originally recorded by Greenwood and Foster [1984] during the cable replacement project, as discussed above) and at three isolated artifacts. CA-SBA-1869 was found to lie just north of a dirt road that is just north of West Housing. Sixteen shovel test pits and a single 1 by 1 meter unit yielded three bifaces, seven cores, one edge-modified piece, and 1,475 flakes. A burned bone was recovered from the surface. The site's integrity was found to be moderately impaired although intact deposits were identified. Regardless, the site was evaluated as ineligible for the NRHP because it did not contain sufficient data to address important research issues. In particular, the site lacked chronological data (Price et al. 1996:21).

Shovel test pits were excavated at three of the isolated artifact locations. Four shovel test pits at CA-SBA-ISO-607 (subsequently re-designated VAFB-ISO-169, in East Housing) indicated that the isolated chert biface was not associated with an archaeological site. Four probes at CA-SBA-ISO-608, also in East Housing, determined that the original isolated fragment of marine shell was actually an archaeological site that was subsequently designated as site CA-SBA-3487 and tested to assess significance (McKim and Price 1997). Four shovel test pits at CA-SBA-ISO-610, in West Housing, also yielded artifacts and was designated site CA-SBA-3741; it also was tested to assess significance (Lebow and Haslouer 2005). The fourth isolated artifact identified by Price et al. (1996), CA-SBA-ISO-609, was subsequently re-designated VAFB-ISO-170. It was a shell pendant fragment found on a lawn in West Housing and was considered out of context. However, subsequent work identified other cultural materials and the location was designated as site CA-SBA-3748 (Stevens et al. 2005).

Lebow and Haslouer (2005) continued the housing investigations begun by Price et al. (1996) by testing CA-SBA-3741 (originally recorded as isolated artifact CA-SBA-ISO-610) to evaluate NRHP eligibility. That effort included excavation of 67 shovel test pits and eight 1 by 1 meter test units that, altogether, yielded 1,218 flakes, four biface fragments, three cores, one projectile point fragment, six unpatterned flake tools, 10 bones, one marine shell fragment, one fire-altered rock, six pieces of ochre, and four pieces of asphaltum. Radiocarbon analysis revealed that the site was occupied around A.D. 1400. Although the integrity of CA-SBA-3741 had clearly been affected by construction of the family housing and associated infrastructure, roughly 55 percent of the site area was considered intact. Because data from the site could be used to address questions important to understanding prehistory, Lebow and Haslouer (2005:9.2–9.3) opined that CA-SBA-3741 was eligible for the NRHP. Furthermore, they argued that replacement of military family housing within the site would adversely affect the site's significant qualities.

Stevens et al. (2005) documented archaeological investigations associated with a proposed expansion of West Housing. That expansion has since been dropped from consideration. Although the Expansion Project itself was outside the scope of the Military Family Housing Privatization Project, the Stevens et al. (2005) effort included work within West Housing (i.e., within the Privatization Project area). Specifically, they completed subsurface testing in the vicinity of the marine shell pendant fragment originally reported by Price et al. (1996) as isolated artifact CA-SBA-ISO-609 and subsequently designated VAFB-ISO-170. Initial testing found flakes in the isolated artifact vicinity and the location was designated as site CA-SBA-3748. Subsequent testing to evaluate NRHP eligibility included excavation of 33 shovel test pits and two 1 by 1 meter units. Together, these units yielded only 16 flakes. Of those, 13 were found within fill that had been imported during construction of the family housing and the context of the remaining three flakes was unclear. Due to the lack of integrity and the low artifact density in intact deposits, Stevens et al. 2005:10.6) recommended that CA-SBA-3748 was not eligible for the NRHP.

Most recent of the military family housing archaeological studies is a survey of the entire cantonment area, including the portions of West Housing not previously inspected (Applied EarthWorks, Inc., in progress). No new archaeological resources were identified within West Housing. A small cluster of marine shell, including abalone, chiton, and clam shells, was identified in an open area between Ash and Aspen Streets. Some of the abalone shell fragments had been water-rolled and the chiton and clam shells appeared to be relatively fresh. Clam shells are extremely rare in prehistoric archaeological assemblages on Vandenberg AFB. Shells from California mussel were conspicuously absent; they typically comprise more than 90 percent of prehistoric shellfish assemblages on the Base. A single chunky piece of Monterey chert was found, but it was not directly associated with the marine shell and appeared more similar to road gravel than to a prehistoric artifact. Given these characteristics, the location appears to reflect a collection of shells deposited by an occupant(s) of military family housing. Consequently, the location was not recorded as an archaeological site.

2.2 Cultural Resources within and Adjacent to the MFH Privatization Project

Background research revealed that 15 archaeological sites and six isolated artifacts are recorded within 0.25 mile of the MFH Privatization Project area (Tables 2 and 3, see below). Archaeological sites within the MFH Privatization Project area or within 60 meters of the project area include CA-SBA-1869, -3559H, -3741, and -3752. The only isolated artifact within the project area or the 60 meter buffer is VAFB-ISO-228. Each of these resources is described below.

2.2.1 CA-SBA-1869

CA-SBA-1869 was initially recorded as more than 20 secondary chert flakes within a 50-meter-diameter area during a survey for a cable replacement project (Greenwood and Foster 1984). At the time of its

initial discovery, the site was plotted about 45 meters north of the dirt road at the northern edge of the West Housing complex. A single shovel test pit excavated in the site center yielded 10 flakes. No cultural constituents other than flaked stone were identified and the site was considered a seasonal processing camp. Due to the lack of temporal indicators and the limited constituent density and diversity, Greenwood and Foster (1984:44) indicated that the site was not eligible for the NRHP. Gibson (1986) monitored installation of the replacement cable and found that CA-SBA-1869 was much larger than previously suggested. Although Gibson's effort did not reveal temporal indicators or greater constituent density or diversity, he disagreed with the previous assessment and argued that the site was eligible for the NRHP.

Price et al. (1996) found that CA-SBA-1869 was within the area of potential effects (APE) for a military family housing replacement project and tested the site in an effort to more thoroughly evaluate NRHP eligibility. This effort revealed that the southern edge of the site is about 45 meters north of the fence around the existing housing complex. Excavations included 16 shovel test pits and a single 1 by 1 meter unit; the total excavation volume was 4.82 cubic meters. Artifacts recovered included three bifaces, seven cores, one edge-modified piece, and 1,475 flakes. A burned bone was recovered from the surface. Artifacts were concentrated in the center of the site. Excavations in the southern portion of the site—closest to the housing complex—revealed that the culture-bearing sediments had been removed, probably during construction of the houses and perimeter road.

Site integrity was found to be compromised, particularly in the southern portion. However, parts of the site remain intact and CA-SBA-1869 was judged to be "moderately impaired." Although intact portions remained, Price et al. (1996:21) argued that the site was not eligible for the NRHP because it lacked chronological data and because the archaeological assemblage was limited to flaked stone without evidence of subsistence remains. Regardless, Price et al. (1996:21-21) recommended that construction activities should be limited to the south side of the dirt road and that the site area should be flagged as an exclusion zone.

2.2.2 CA-SBA-3559H

Archival research for the military family housing replacement project indicates that this site is the approximate location of a prisoner-of-war (POW) cemetery used during World War II. It lies along the northern edge of West Housing. On October 9, 1944, a camp for German POWs—with associated cemetery—was started at Camp Cooke (now Vandenberg AFB). However, archival research also revealed that all of the bodies in the cemetery had been exhumed in 1947 and reinterred at the Golden Gate National Cemetery in San Bruno, California (Palmer 2000:186). Grave markers also were removed when the bodies were exhumed. No materials associated with the POW cemetery were observed on the surface during the survey for the housing replacement project (Price et al. 1996). Palmer (2000:186) found a low-density scatter of concrete and milled lumber in an area that had been bladed. No artifacts were found at this location during testing for prehistoric site CA-SBA-3741 (see below), in approximately the same location as the cemetery.

2.2.3 CA-SBA-3741

This site was initially recorded as an isolated chert flake and designated CA-SBA-ISO-610 during the survey for the military family housing replacement project (Price et al. 1996). It was subsequently renumbered VAFB-ISO-171. Excavation of four shovel test pits in the vicinity of the isolated artifact yielded a total of 20 flakes, indicating that the isolated artifact observed on the surface actually represented an archaeological site. This realization prompted Price et al. (1996:25) to recommend that "additional studies will be necessary to establish the extent of this deposit and assess its NRHP eligibility."

Testing to define site boundaries and evaluate NRHP eligibility was completed in August and October of 2004 (Lebow and Haslouer 2005). This effort included 67 shovel test pits and four 1 by 1 meter excavation units (a total volume of 21.47 cubic meters), revealing that the site encompasses 12,900 square meters. It lies primarily within the existing West Housing complex but also extends slightly outside to the north-northeast.

Recovered cultural constituents include 1,218 flakes, four biface fragments, three cores, one projectile point fragment, six unpatterned flake tools, 10 vertebrate faunal remains, one marine shell fragment, one fire-altered rock, six pieces of ochre, and four pieces of asphaltum. Radiocarbon analysis indicates that the site was occupied around A.D. 1040, corresponding to the late Middle Period. All vertebrate faunal remains are from medium/large mammals. The biface fragments are unused production rejects; functional analysis of the flake tools indicates that five of the six were used for skinning/butchering animals. Lithic debitage corresponds with the tool assemblage and indicates that on-site knapping included core reduction to produce flake tools and early-stage biface reduction. The distribution of lithic artifacts is clearly patterned, with the highest flake density southwest of Korina Street but the highest tool density northeast of the street. All of the production rejects are northeast of Korina Street, while the tool assemblage southwest of the street is dominated by flake tools (Lebow and Haslouer 2005).

The site apparently functioned as a short-term residence for people focused on hunting medium/large mammals. Given the relative lack of resources on Burton Mesa and the proximity of the site to the resource-rich San Antonio Creek valley, it is likely that site occupants were concentrating on the valley rather than the mesa. Because data from the site can be used to increase the current understanding of local settlement systems, Lebow and Haslouer (2005) opined that CA-SBA-3741 is eligible for the NRHP. Furthermore, because the site is within an area where houses will be demolished and replaced, Lebow and Haslouer found that the site's significant qualities might be adversely affected by the housing replacement project.

2.2.4 CA-SBA-3748

This site was previously recorded as an isolated abalone pendant (designated CA-SBA-ISO-609 and subsequently renumbered VAFB-ISO-170) found in the lawn of an existing house at the western edge of West Housing (Price et al. 1996). Limited subsurface probing nearby for the MFH Expansion Project (Stevens et al. 2005) found cultural materials and the isolated artifact was designated archaeological site CA-SBA-3748. Subsequent excavation of 33 shovel test pits and two 1 by 1 meter test excavation units (a total volume of 7.22 cubic meters) within and adjacent to the existing housing complex yielded a small collection of 16 flakes. Most (13) of these were found in fill than had been imported to elevate the existing housing development. The integrity of the remaining three flakes was unclear. Given the low artifact density and the poor integrity, Stevens et al. (2005) opined that CA-SBA-3748 is not eligible for the NRHP.

2.2.5 VAFB-ISO-228

This isolated chert flake was documented during a survey for a trail in the Capehart military family housing. It was found just outside the eastern edge of West Housing, in a landscaped area bordering the housing complex. The immediate vicinity was obviously disturbed and consequently the isolated artifact was not considered significant (SAIC 1994a:6). No subsurface archaeological excavations have been completed at this location.

3.0 ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

Cultural resources would be adversely affected if the proposed action would cause loss of the value or characteristics that qualify them for listing on the NRHP, or if the proposed action substantially alters the natural environment or access to it in such a way that traditional cultural or religious activities are restricted. Criteria used to evaluate the significance of cultural resources and to assess potential adverse project effects are set forth in the National Historic Preservation Act (NHPA) of 1966 (as amended). Associated implementing regulations include 36 CFR 60 and 800. The proposed action will comply with all relevant authorities governing cultural resources, including Section 106 of the NHPA and AFI 32-7065. In the event that previously undocumented cultural resources are discovered during construction activities, procedures established in 36 CFR 800.13 will be followed.

The following sections discuss the consequences of the proposed action on cultural resources within or near the MFH Privatization Project area. Table 4 (see below) summarizes the environmental consequences and mitigation measures. The following discussion of environmental consequences assumes that all privatization activities will be limited to the project area illustrated in Figure 1-2 of the Environmental Assessment.

To comply with Section 106 of the NHPA and 36 CFR 800, the 30 CES/CEVNC at Vandenberg AFB has consulted with the California State Historic Preservation Officer (SHPO) and with the Tribal Elders' Council of the Santa Ynez Band of Chumash Indians regarding the Military Family Housing Privatization Project. Consultation with the SHPO was initiated in a letter dated 13 July 2006, describing the undertaking and requesting concurrence with a finding of no adverse effect. The letter was accompanied by the report *Archaeological Investigations Supporting Consultation with the State Historic Preservation Officer for the Privatization of Military Family Housing on Vandenberg Air Force Base, Santa Barbara County, California* (Lebow et al. 2006) detailing the archaeological studies completed for military family housing. In a 2 August 2006 letter, the SHPO concurred with the determination of no adverse effect from privatization of military family housing. The Air Force reopened consultation with the SHPO in a letter dated 18 December 2006, after the privatization undertaking was modified, but the finding of no adverse effect remained. The SHPO again concurred, in a letter dated 5 February 2007.

Native American consultation included various meetings between the Air Force and the Tribal Elders' Council of the Santa Ynez Band of Chumash Indians. On 26 July 2004, staff from the 30 CES/CEVNC used a Microsoft PowerPoint presentation to discuss the proposed housing replacement and potential housing expansion. On 4 August and again on 14 October 2004, staff from the 30 CES/CEVNC met on site with Tribal Elders to discuss the archaeological excavations in progress at CA-SBA-3741. The purpose of all of these meetings was to determine whether the Tribal Elders' Council had information or concerns about archaeological sites, ethnohistoric sites, or traditional cultural properties within the project areas. On 29 August 2005, staff from the 30 CES/CEVNC used a Microsoft PowerPoint presentation to explain the MFH Privatization Project and to discuss the tribe's concerns regarding treatment of CA-SBA-3741. On 26 October 2005, the Air Force (including the staff from the 30 CES/CEVNC and representatives of the privatization effort) met on-site with Tribal Elders at CA-SBA-3741 to discuss the site and management options.

3.1 CONSEQUENCES OF THE PROPOSED ACTION

3.1.1 CA-SBA-1869

This site is not within the footprint of the MFH Privatization Project area (Figure 1-2) but is within the 60 meter buffer around West Housing. Specifically, the site's southern boundary—which was defined by subsurface testing—lies about 40 meters north of the perimeter fence around the housing complex.

Excavations revealed that the culture-bearing deposit between the site and the fence apparently was removed during construction of the existing housing. Price et al. (1996:21–22) opined that the site is not eligible for the NRHP but recommended that all ground-disturbing activities associated with housing replacement be restricted to the south side of the dirt road that parallels the northern edge of West Housing and that the north side of the road in the site area should be flagged as an exclusion zone. In addition, an archaeologist and a Native American will monitor all ground disturbing activities within 30 meters of the site boundary, per Volume 5 of Vandenberg AFB's draft *Integrated Cultural Resource Management Plan*. With these measures, the proposed action for the MFH Privatization Project will have no environmental consequences for CA-SBA-1869.

3.1.2 CA-SBA-3559H

This site is the POW cemetery associated with Camp Cooke, although the burials were exhumed and reburied at the Golden Gate National Cemetery in 1947. Palmer (2000:186) indicates that the cemetery was bladed. In their 13 July 2006 consultation letter with the SHPO, the Air Force indicates that the site is not eligible for the NRHP. The SHPO concurred. Because the burials were removed and the site is not NRHP-eligible, the MFH Privatization Project proposed action will have no environmental consequences for CA-SBA-3559H. An archaeologist will monitor all ground disturbing activities within 60 meters of the site.

3.1.3 CA-SBA-3741

This prehistoric site is within and adjacent to a portion of West Housing. Lebow and Haslouer (2005) found significant, intact cultural deposits in the site, including the area within the existing housing development. The Air Force determined that the site is eligible for the NRHP in their 13 July 2006 consultation letter, and the SHPO concurred.

Subsequently to the NRHP eligibility determination, it was learned that CA-SBA-3741 was within an area designated as the "Grenade Court," a grenade training area that may have been used during the Camp Cooke era. It is unclear whether the Grenade Court was ever built or ever used. To investigate the possibility of unexploded ordinance, a non-invasive magnetometer survey of the Grenade Court area was completed and 411 targets of interest were identified, including 149 within CA-SBA-3741. However, no ground-truthing has been completed to determine whether any of the targets of interest represent ordinance.

Because CA-SBA-3741 is eligible for the NRHP, it has been placed within a 4.7-acre Environmental Exemption Area. Given that the intact, significant site deposits are capped with imported fill, demolition of the existing 18 houses within the exemption area can proceed without adversely affecting the site's significant qualities. All buried utilities and Korina Street will be abandoned in place. Only rubber-tired vehicles (such as backhoes) will be allowed on the site. Driveways, sidewalks, and the concrete slabs under each house will be broken into manageable pieces and lifted to avoid any impacts that might occur from digging these features. Imported soil will be used to fill depressions remaining after concrete removal. All demolition activities within the Environmental Exemption Area will be monitored by an archaeologist and a Native American.

The Environmental Exemption Area will be included in the privatization lease for five years to allow demolition. After five years, CA-SBA-3741 will be removed from the lease and the site area will be maintained by the Air Force as a green space with plantings of native trees and shrubs.

In their 18 December 2006 consultation letter with the SHPO, the Air Force detailed protocols that will be followed to ensure that the site area is safe from unexploded ordinance associated with the possible

Grenade Court, while also minimizing impacts to the site. Targets of interest outside the site will be investigated first. If these are negative, it will be considered evidence that the Grenade Court was not built or not used. In that case, Vandenberg AFB will petition the Department of Defense to leave the 149 targets of interest within CA-SBA-3741 intact. If it is necessary to investigate the magnetometer anomalies within the site, excavations will be as small and as shallow as possible. It is likely that metal objects will be found in disturbed and imported soil that caps the site. These excavations would be completed under the guidance of a qualified archaeologist. The SHPO concurred with this approach in a letter dated 5 February 2007.

With the restrictions of the Environmental Exception Area and the protocols for the unexploded ordinance, the Air Force determined that MFH Privatization Project will not adversely affect CA-SBA-3741. The SHPO concurred. Consequently, the MFH Privatization Project proposed action will have no environmental consequences.

3.1.4 CA-SBA-3748

This prehistoric site is within and adjacent to the west edge of West Housing. Stevens et al. (2005) tested CA-SBA-3748 and found that it has poor integrity and little data potential, and opined that it is ineligible for the NRHP. In their 13 July 2006 consultation letter with the SHPO, the Air Force determined that the site was not eligible for the NRHP and the SHPO concurred. As a result, the MFH Privatization Project proposed action will have no environmental consequences for the site. Per requirements in Volume 5 of the Vandenberg AFB draft *Integrated Cultural Resources Management Plan*, an archaeological and Native American monitor will observe all ground disturbing activities within 30 meters of the site.

3.1.5 VAFB-ISO-228

This isolated artifact lies just outside the southeastern edge of West Housing and thus is just outside the MFH Privatization Project area but is within the 60 meter buffer. The artifact was found in a disturbed context and consequently was considered insignificant by the recorders (SAIC 1994a). An archaeologist and a Native American will monitor all ground disturbing activities within 60 meters of the artifact's plotted location. With that measure, the MFH Privatization Project proposed action will have no environmental consequences.

3.2 ALTERNATIVE ACTIONS

Four alternative actions have been proposed but none are considered feasible and therefore their environmental consequences for cultural resources are not evaluated.

Under the no action alternative, Vandenberg AFB would continue to provide military family housing needs. Those needs would include maintenance, replacement, and new construction. Any ground disturbing activities from maintenance, replacement, or new construction that is in or near the sites would have the same environmental consequences and mitigation measures as discussed in Section 3.1 for the preferred action.

4.0 SUMMARY

Five cultural resources are within or near the MFH Privatization Project area: CA-SBA-1869, -3559H, -3741, -3748, and VAFB-ISO-228 (see Table 4, below). Archaeological monitoring will be necessary during any ground disturbing activities within or near each of these resources. Native American monitoring will be necessary during any ground disturbing activities at the same sites except CA-SBA-3559H.

The only significant (i.e., eligible for the NRHP) cultural resource within the MFH Privatization Project area is CA-SBA-3741. This site is within an Environmental Exemption Area. Demolition of the 18 houses within the site will be allowed, with restrictions, and after five years the lease will expire and the site will be maintained as a green space by the Air Force.

With these measures, the proposed action will have no environmental consequences for cultural resources. The no action alternative will have no environmental consequences and will require the same mitigation measures as the proposed action.

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Table 1
Previous Cultural Resources Studies within 1.0 Mile of the MFH Privatization Project Area

Reference (listed chronologically)	VAFB Reference Number	UCSB Reference Number
Craig (1980)	1980-13	
WESTEC Services, Inc. (1981)	1981-04	V-16
WESTEC Services, Inc. (1982a)	1982-02	
Neff (1982)	1982-06	V-9
WESTEC Services, Inc. (1982b)	1982-10	
WESTEC Services, Inc. (1984)		V-24
Greenwood and Foster (1984)	1984-12	V-26
Chambers Consultants and Planners (1984)	1984-26	
Dames & Moore (1985)	1985-05	V-36
Foster and Greenwood (1985)	1985-12	
Foster (1985)	1985-19	
Gibson (1986a)	1986-08	
Gibson (1986b)	1986-13	
Waldron (1988)		V-256
Snethkamp et al (1989)		E-845a
United States Air Force (1990)		V-133
Berry (1990)	1990-20	V-128
Snethkamp et al. (1990)		E-845b
Berry (1991)	1991-03	V-131
Berry (1994)	1994-01	
SAIC (1994a)	1994-05	
SAIC (1994b)	1994-06	V-209
Eisentraut (1995)	1995-11	
SAIC (1995)	1995-19	
Price et al (1996)	1996-03	V-146
Minas (1996)	1996-01	B-154
Wilcoxon and Haley (1996)	1996-07	V-164
Clark (1997)	1997-01	V-159
McKim and Price (1997)	1997-19	V-179
Carbone and Mason (1998)	1998-03	
Curt (2000)		V-273
Lebow and Haslouer (2005)		
Stevens et al. (2005)		
Applied EarthWorks, Inc. (in progress)		

Table 2
Recorded Archaeological Sites within 0.25 Mile of the MFH Privatization Project Area

CA-SBA-1022	CA-SBA-2888
CA-SBA-1064	CA-SBA-3112
CA-SBA-1065	CA-SBA-3559H
CA-SBA-1066	CA-SBA-3560H
CA-SBA-1867	CA-SBA-3741
CA-SBA-1868	CA-SBA-3748
CA-SBA-1869	CA-SBA-3857
CA-SBA-2346	

Table 3
Isolated Artifacts Recorded within 0.25 mile of the MFH Privatization Project Area

VAFB Number	Isolate Description
VAFB-ISO-171	One Monterey chert Flake
VAFB-ISO-173	One large lateral fragment of a crude, probably ovate biface made of blonde Monterey chert
VAFB-ISO-185	One Monterey chert flake
VAFB-ISO-228	One black banded Monterey chert flake, 4.5 by 4.5 by 1.0 cm
VAFB-ISO-437	Unknown
VAFB-ISO-708	Horse drawn wagon remains

Table 4
Summary of Environmental Consequences for Cultural Resources, MFH Privatization Project

Resource Designation	Within Project Area	Within 60 m Buffer	NRHP Eligible	Environmental Consequence	Mitigation Measures
CA-SBA-1869	No	Yes	No	None	Privatization activities will be restricted to the area south of the dirt road that borders the northern edge of West Housing. An archaeologist and a Native American will monitor all ground disturbing activities within 30 meters of the site.
CA-SBA-3559H	Yes	Yes	No	None	An archaeologist will monitor all ground disturbing activities within 60 meters of the site.
CA-SBA-3741	Yes	Yes	Yes	None	The site is within an Environmental Exemption Area. Demolition will proceed with restrictions; all buried utilities and Korina Street will be abandoned in place. Rubber-tired equipment will be used to break and remove concrete driveways, sidewalks, and slabs; imported soil will be used to fill depressions remaining after concrete removal. All demolition will be monitored by an archaeologist and a Native American. The site will be removed from the privatization lease after five years and will be maintained by the Air Force as a green space with plantings of native trees and shrubs. Investigations for unexploded ordinance may be necessary within the site if magnetic anomalies outside the site indicate the area was used for grenade training during the Camp Cooke era. In this case, excavation would be expected to consist of small shallow holes primarily in imported fill. Excavation would be done under the guidance of a qualified archaeologist.
CA-SBA-3748	Yes	Yes	No	None	An archaeologist and a Native American will monitor all ground disturbing activities within 30 meters of the site.
VAFB-ISO-228	Yes	Yes	No	None	An archaeologist and a Native American will monitor all ground disturbing activities within 60 meters of the isolated artifact.

APPENDIX C: CORRESPONDENCE

CEV

STATE OF CALIFORNIA – THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, *Governor*

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
P.O. BOX 942896
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calshpo@ohp.parks.ca.gov
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August 2, 2006 In reply refer to: USAF060717C

Lt Col Darren R. Daniels
Commander
US Department of the Air Force
30th Space Wing (AFSPC)
30 CES/CC
1172 Iceland Avenue
Vandenberg AFB, CA 93437-6012

Re: Privatization of Military Family Housing, Vandenberg Air Force Base, Santa Barbara County, California

Dear Lt Col Daniels:

Thank you for your letter of 13 July 2006, requesting my comments with regards to the proposed privatization of military family housing at Vandenberg Air Force Base (VAFB), California. You are consulting with me, in order to comply with Section 106 of the National Historic Preservation Act (NHPA) and implementing regulations codified at 36 CFR § 800.

The proposed undertaking would include the demolition of 1,167 houses, construction of 684 new houses, renovation of 835 existing houses, and the management of all housing units under a lease agreement for 50 years. During the development period and throughout the lease period, VAFB will retain responsibility for compliance with applicable laws governing the management and treatment of cultural resources. The proposed Area of Potential Effect is defined as the lease boundary. I agree that the Air Force has properly determined and documented the APE per 36 CFR § 800.4 (a)(1).

Your efforts to identify historic properties, which I agree have been appropriate per 36 CFR § 800.4(b), found five archaeological sites (CA-SBA-3270, -3487, -3559H, -3741, and -3748) and one building greater than 50 years old (Sesto Auditorium) within the APE . The Air Force has determined that CA-SBA-3741 is eligible for inclusion in the National Register of Historic Places (NRHP) under criterion D for its potential to add to the understanding of prehistoric subsistence and settlement patterns within the coastal zone of Central California. The Air Force has further determined that CA-SBA-3270, -3487, -3559H, -3748, and the Sesto Auditorium are not eligible for inclusion in the NRHP. Based upon a review of the documentation you submitted with your letter, including the report *Archaeological Investigations Supporting Consultation with the State Historic Preservation Officer for the Privatization of Military Family Housing on Vandenburg Air Force Base, Santa Barbara County* (February 2006), I concur in your determinations.

The Air Force has applied the criteria of adverse effect per 36 CFR § 800.5(a) and has determined that the undertaking will not adversely affect the NRHP-eligible properties. Based on my review of the documents you submitted, I concur with this determination.

Thank you for seeking my comments and considering historic properties as part of your project planning. If you have any questions or concerns, please contact David Byrd, Project Review Unit historian, at (916) 653-9019 or at dbyrd@parks.ca.gov.

Sincerely,

Susan K Stratton for

Milford Wayne Donaldson, FAIA
State Historic Preservation Officer

MWD:db

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO:
PAS 1358.3901.4826

May 17, 2006

Beatrice L. Kephart
Chief, Environmental Flight
30 CES/CEV
806 13th Street, Suite 116
Vandenberg Air Force Base, California 93437-5242

Subject: Biological Opinion for the Military Family Housing Project at Vandenberg Air Force Base, Santa Barbara County, California (1-8-06-F-7).

Dear Ms. Kephart:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion on our review of the U.S. Air Force's (Air Force) proposed Military Family Housing project and its effects on the federally endangered Gaviota tarplant (*Deinandra increscens* subsp. *villosa*), in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 et seq.). We received your letter dated January 4, 2006, via facsimile, requesting formal consultation on the same day.

This biological opinion was prepared using information provided in your request for formal consultation, electronic mail and telephone conversations between our staffs, and information in our files. A complete administrative record for this biological opinion is on file at the Ventura Fish and Wildlife Office.

CONSULTATION HISTORY

On February 27, 2006, the Air Force submitted a change in the project description that included three additional expansion areas for the proposed project. In addition, the Air Force proposed to conduct unexploded ordnance (UXO) surveys in March 2006 at the east and west housing areas. No populations of Gaviota tarplant have been recorded in the east and west housing areas, and therefore the Air Force determined that unexploded ordnance surveys in these areas would not affect Gaviota tarplant. We concur with this determination.

BIOLOGICAL OPINION

PROJECT DESCRIPTION

The Military Family Housing project has two components; privatization and expansion. The privatization project consists of a geophysical prove-out (to calibrate the survey equipment) and UXO surveys with possible vegetation removal. The expansion project consists of building additional housing units adjacent to, or in close proximity to, existing housing units at the west housing area. The Air Force proposed to utilize areas A-D for expansion (Figure 1); however, it is unlikely that all four areas would be built-out as part of this consultation (Lum 2006b).

As part of the privatization, the Air Force would conduct a geophysical survey in a prove-out area measuring approximately 450 square meters. The area selected would represent a location that has similar soil, geography, terrain, vegetation, and cultural features as the project area. Subsequently, the Air Force would conduct pre-construction surveys for the presence of UXO throughout the four expansion areas and remediate if necessary. A remediation effort would require ground disturbance and vegetation clearing to remove the UXO. The east (189 acres) and west (458 acres) housing areas were surveyed in March 2006.

Following the completion of the UXO surveys, the Air Force would construct military family housing units at the four expansion areas, including roads and walkways, underground utilities, and urban and recreational facilities. The project is estimated to last 96 weeks.

A qualified botanist would monitor project activities and flag areas with existing individuals of Gaviota tarplant to avoid during UXO vegetation clearing. If feasible, the Air Force would conduct UXO vegetative clearing after seed set and before germination of Gaviota tarplant. In addition, the Air Force proposes to enhance a designated area outside of the project area by removing invasive, non-native plant species in an area that is: 1) suitable for Gaviota tarplant and would preferably have an existing population; 2) located as close as possible to the project site; and 3) likely not to be developed in the future.

STATUS OF THE SPECIES

Gaviota tarplant was federally listed as endangered on March 20, 2000 (65 FR 14888). We designated critical habitat for the Gaviota tarplant on November 7, 2002 (67 FR 67968); Vandenberg Air Force Base was excluded from this designation under section 4(b)(2) of the Act.

Gaviota tarplant seeds germinate in response to significant rainfall. Seedlings have been observed as early as January (URS 1988). Plants grow through the spring and peak flowering ranges from late May to late July, depending on the year. By late summer or fall, most plants have died although a few continue to flower and produce seed (AAPC 1992). Except in a very few cases, the individuals still active in the late season are located where the depth to the clay layer is greater, or where soil is less compacted. Nearly all plants will have died by mid-October.

As is typical of annual plant species, the number of individuals present above-ground from one year to the next varies dramatically, most likely depending on climatic conditions such as amount of rainfall, timing of rainfall, and temperature regimes during critical stages of germination and seedling growth. In some years, patches may contain few to no individuals (Howald 1989), but a seed bank likely persists in the soil.

Gaviota tarplant seeds most likely are dispersed by adhesion of the sticky bracts clasping the ray flowers to animal fur or feathers (Baldwin in litt. 2001). Likely seed/fruit dispersal organisms include, but are not limited to, mule deer (*Odocoileus hemionus*), gray foxes (*Urocyon cinereoargenteus*), coyotes (*Canis latrans*), black-tailed jackrabbits (*Lepus californicus bennettii*), bobcats (*Felis rufus*), striped skunks (*Mephitis mephitis*), opossums (*Didelphis virginiana*), raccoons (*Procyon lotor*), and small land birds (66 FR 32052).

Pollinators observed on the flowers include several species of flies (Diptera), bees (Hymenoptera), and skippers and butterflies (Lepidoptera) (Howald 1989). Gaviota tarplant depends on the successful transfer of pollen between plants to produce seeds because most *Deinandra* spp. are strongly self-incompatible (Tanowitz 1982; Baldwin in litt. 2001), meaning that self-fertilization does not occur and insects are necessary for the transfer of pollen.

This species is found on sandy soils associated with marine terraces and uplifted marine sediments, ranging from 46 meters in elevation along the lowest terraces to 305 meters (Hendrickson *et al.*1998; CNDDB 2001; Wilken 1998). At this higher elevation, the taxon is known to occur in grasslands above the 215 meter contour line west of Sudden Peak, Santa Barbara County (CNDDB 2001; Wilken 1998). Soil characteristics have been studied most extensively near the Gaviota location. There, the plant is restricted to Conception and Milpitas-Positas soils, which consist of acidic, fine, sandy loams (AAPC 1995). A subsurface clay layer 2.5 to 90 centimeters deep may serve as a reservoir of soil moisture in an area otherwise characterized by summer drought (Howald 1989). However, Gaviota tarplant consistently occurs where the depth to clay is only 2.5 to 5.0 centimeters (Rindlaub, in litt. 1998).

Gaviota tarplant has a highly localized distribution in western Santa Barbara County, where it is associated with grasslands comprised of native needlegrass (*Nassella* spp.), non-native wild oats (*Avena* spp.), ripgut brome (*Bromus diandrus*), and other herbs and grasses. The grasslands intergrade with coastal sage scrub composed of California sagebrush (*Artemisia californica*), coyote brush (*Baccharis pilularis*), sawtooth golden bush (*Hazardia squarrosa*), and California buckwheat (*Eriogonum fasciculatum*) (CNDDB 2001). Until several years ago, populations of Gaviota tarplant were only known from marine terraces in the vicinity of Gaviota. However, populations were observed at approximately seven new locations ranging westward from Gaviota along the coast and in the Santa Ynez Mountains to Point Arguello (Meyer 2001; Hendrickson et al. 1998).

The narrow coastal terrace at Gaviota is bisected lengthwise by Highway 101, a railroad, and several pipelines. Most of the habitat for Gaviota tarplant that lies on the north side of Highway 101 is on private lands owned by the petroleum industry. Petroleum companies have leased land at

Government Point for their facilities, just east of Point Conception. A few colonies occur on the south side of Highway 101 on land owned by California Department of Parks and Recreation. Most of the other populations west of Gaviota are located on private land.

The Air Force has recorded Gaviota tarplant at several locations on Vandenberg Air Force Base, including four populations on south base, two populations north of the north base entrance, three populations along San Antonio Creek, several populations scattered within the cantonment area and along roadsides, and near Point Arguello.

The Gaviota tarplant is threatened by destruction of individual plants, habitat loss, and habitat degradation from the development and decommissioning of oil and gas facilities, including pipelines, incompatible fire management practices, residential and commercial development, and competition with non-native weeds (65 FR 14888). Within the last 5 years, two aggressive non-native grasses, veldt grass (*Ehrharta calycina*) and harding grass (*Phalaris aquaticus*), have invaded the Gaviota site and pose a serious threat to Gaviota tarplant and the remaining coastal prairie habitat at this site (Rindlaub 2001; Meyer 2001).

The populations in the vicinity of Point Conception and Government Point face similar threats to those in the Gaviota area, specifically from activities associated with the decommissioning of oil and gas facilities, and from alteration of habitat due to the spread of iceplant (*Carpobrotus* spp.) and veldt grass (Meyer 2001). However, some of the populations found within the last three years are in remote areas in the Santa Ynez Mountains and do not appear to be threatened at this time.

Generally, Gaviota tarplant appears to have few predators. Grazing and browsing animals, such as horses, cattle, and deer avoid the strong smelling, resinous plants when feeding. Some predation on immature fruit (usually disk achenes) by small black flower beetles has been noted in wild populations (AAPC 1995).

Gaviota tarplant responds positively to some types of soil disturbance, which may increase seed coat permeability through abrasion. Light disturbance during the dry season, such as occasional foot, livestock, or vehicular traffic seem to enhance tarplant growth. This is supported by its distribution along footpaths, livestock trails, and roadsides (URS 1988; AAPC 1990). Disturbance when the soil is wet is likely to kill tarplant seeds as well as young seedlings.

Overall, the Air Force has adversely affected approximately 0.50 acre of tarplant through mission critical activities. We have not consulted on any other proposed projects within the range of the species. Given all other factors (e.g., competition from non-native plants), we conclude that the Gaviota tarplant population is stable to slightly declining throughout its range.

ENVIRONMENTAL BASELINE

The implementing regulations for section 7(a)(2) of the Act define the "action area" as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 C.F.R. 402.02). For the purposes of this biological opinion, we

consider the action area to be expansion areas A and B (191 acres) because these are the only two expansion areas proposed for development that contain Gaviota tarplant.

The Air Force completed surveys and recorded the location of individuals or clusters of Gaviota tarplant, via a Global Positioning Satellite (GPS) device, at the expansion areas and the east and west housing areas in 2004 and 2005. Approximately 1,860 individuals were recorded along the existing dirt road in expansion area A, mostly located within 10 meters of the gravel access road on the eastern side of the area. An unknown number of individuals were scattered throughout the southern portion of expansion area B. The Air Force did not observe Gaviota tarplant in expansion areas C or D or at the east or west housing areas.

Expansion area A consists mostly of non-native woodland where Monterey pine (*Pinus radiata*) widely occurs, and non-native grassland dominated by veldt grass, with non-native annual grasses such as slender wild oat (*Avena barbata*) and various species of brome. Expansion areas B-D are generally considered within the urban landscape: area B is partially forest dominated by Bishop pine (*Pinus muricata*), area C consists of non-native grasses, and area D is a mixed community of *Eucalyptus* spp., pine, and ruderal grasses.

EFFECTS OF THE ACTION

Activities conducted within expansion areas A and B that could directly or indirectly adversely affect Gaviota tarplant include surveying for UXO, grading prior to construction, and constructing military family housing with the installation of utilities, houses, roads, sidewalks, and other urban and recreational facilities. The potential impacts associated with these activities include crushing of plants and/or seeds (through mechanical or foot traffic), altering the hydrology of suitable habitat, and removal of individual plants and their seed bank. The Air Force has determined that the project would affect up to a maximum of 2.51 acres of Gaviota tarplant.

The Air Force proposes to survey for UXO throughout the expansion areas and flag existing individuals of Gaviota tarplant, thereby informing personnel of areas to avoid, if possible. However, if it is not possible for the Air Force to avoid some individuals of Gaviota tarplant, they may be crushed by workers and/or equipment during survey activities. Prior to these surveys, the Air Force would remove some of the vegetation in the expansion areas to accommodate the UXO survey effort, but would leave vegetation remaining for aesthetic value for the housing units. Vegetation that the Air Force would remove would be mowed to a height of 6 inches or less above ground level. If existing Gaviota tarplants are mowed to a height of 6 inches or less, they would die and be unable to flower and produce seed, ultimately preventing the plants from replenishing the seed bank.

If UXO sites are identified, the Air Force would remediate as necessary. The ground disturbance caused by remediation efforts may change the hydrology of the soil or make it more difficult for seeds to germinate and grow. A subsequent change in hydrology may increase the invasion of non-native weed species and create more competition for the tarplants. However, Gaviota

tarplant responds positively to some types of soil disturbance, which may increase seed coat permeability through abrasion. Therefore, disturbance from remediation efforts may make germination more likely.

The Air Force would grade and permanently remove all of the vegetation in all four expansion areas. In areas A and B, they would remove 2.51 acres of Gaviota tarplant and the seed bank because of the installation of houses, roads, underground utilities, sidewalks, and other urban and recreational facilities. Even though the Air Force would grade all four areas, they did not observe Gaviota tarplant in areas C or D or the east or west housing areas.

The geophysical prove-out would not occur in an area that contains Gaviota tarplant (Lum 2006a) and a biological monitor would be present during the activities. Therefore, we do not anticipate any effects to Gaviota tarplant from the geophysical prove-out.

To off-set the adverse impacts associated with the military family housing expansion project, the Air Force proposes to enhance another area on base, which is not designated for development, by removing non-native invasive plant species. Although the Air Force has not yet identified the designated area, this action would provide an opportunity for Gaviota tarplant to become established with minimal potential for future adverse effects.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. We are not aware of any other non-federal actions that are reasonably certain to occur in the action area.

CONCLUSION

After reviewing the current status of Gaviota tarplant, the environmental baseline, the effects of the project, and the cumulative effects, it is the Service's biological opinion that the proposed Military Family Housing project is not likely to jeopardize the continued existence of the Gaviota tarplant. We have reached this conclusion because:

1. Only a very small portion of the known Gaviota tarplant population would be adversely affected;

2. The expansion areas are located adjacent to existing buildings and/or structures and only provide low-quality habitat;

3. The Air Force has proposed to have a monitor present during all project activities and flag areas that contain individuals of Gaviota tarplant, thereby informing project personnel of areas to avoid during UXO surveys, if possible; and

4. The Air Force has proposed to off-set the adverse effects from the project by removing non-native invasive plant species at a designated area that is not planned for future development.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act does not address the incidental take of listed plant species. Consequently, this biological opinion does not include an incidental take statement, reasonable and prudent measures, or terms and conditions. However, protection of listed plants is provided in that the Act requires a Federal permit for the removal or reduction to possession of endangered or threatened plants from Federal lands. Furthermore, it is unlawful for any person to remove, cut, dig up, or damage or destroy a listed plant species in knowing violation of any law or regulation of any state or in the course of any violation of a state criminal trespass law [section 9(a)(2)(B) of the Act].

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse affects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. We recommend that the Air Force include measures to conserve Gaviota tarplant in the Integrated Natural Resources Management Plan (INRMP) for Vandenberg Air Force Base.

2. The Air Force should work with the Service to develop a long-term conservation strategy for Gaviota tarplant populations on Vandenberg Air Force Base.

The Service requests notification of the implementation of any conservation recommendations so we may be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats.

REINITIATION NOTICE

This concludes formal consultation on your proposed Military Family Housing project. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) new information reveals effects of the agency action that may affect listed species in a manner or to an extent not considered in this opinion; (2) the agency action is subsequently modified in a manner that causes an effect to the listed species not considered in this opinion; or (3) a new species is listed or critical habitat designated that may be affected by the action.

If you have any questions, please contact Nic Huber of my staff at (805) 644-1766, extension 249.

Sincerely,

Steve Henry
Assistant Field Supervisor
Northern Santa Barbara/San Luis Obispo Counties

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PERSONAL COMMUNICATIONS

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Lum, L. 2006b. Electronic Mail. Military Family Housing updated maps and UXO survey search in March 2006. Dated February 27, 2006. Botanist. Vandenberg AFB. Lompoc, California.

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Figure 1. Location of Expansion Areas A-D (A = 130 acres; B = 60 acres; C = 23 acres; D = 79 acres).